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OCTOBER 1947 • 25 CENTS

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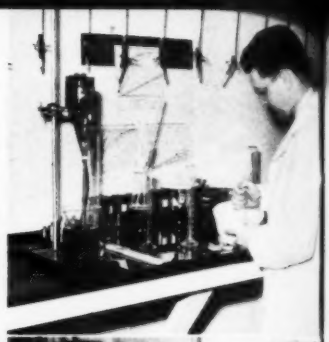

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OCTOBER 1947 VOL. XXXVII No. 4

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BIGGEST NEWS of the month is the creation of an autonomous, independent, co-equal Air Force ranking with the Army and the Navy under the new Department of Defense, headed by James V. Forrestal. This victory comes after 30 years of struggle, maneuver and defeat for those proponents of an independent Air Force. Gen. Spaatz now ranks equally with Gen. Eisenhower and Admiral Nimitz in planning and fighting the defense of the country.

ALSO NEWS are two other developments: (1) the creation of an Air Power policy board and (2) the creation of a National Science Foundation. President Truman's new board, made up of outstanding civilians drawn from numerous fields (other than aviation) is to study the nation's Air Power requirements with particular emphasis on the aircraft industry and its place in Air Power and report their findings to the President by next Jan. 1. The group, long advocated by aviation leaders, may well prove as productive as the 1925 Morrow Board, which literally created the structure of modern American Air Power. The National Science Foundation is designed to coordinate the research effort of the nation by eliminating duplication and by the award of public funds for worthy projects. Dr. Vannevar Bush seems certain of the directorship of the new group.

A FLOCK OF new AAF fighters were released by AAF and these are the long-heralded Buck Rogers fighters of tomorrow. These are: McDonnell XP-85, parasite fighter for Consolidated Vultee XB-36 and capable of 650 mph; North American XP-86, Army version of XFJ-1 with swept wings and capable of 650 mph; Curtiss XP-87, "all weather," four-jet two seat fighter, of 600 mph; McDonnell XP-88, twin-jet of over 700 mph; Northrop XP-89, "delta wing" flying wing of more than 550 mph; Lockheed XP-90 of supersonic speed; Republic XP-91 of supersonic speed; and Consolidated Vultee XP-92, also of supersonic speed. These radical new fighters are slated to fly this year, marking an entirely new era in Army fighter plane design. They are being designed on the basis of wind tunnel data and information learned in construction and flight of the sonic research airplanes: Bell XS-1 and XS-2, and the Douglas D-558. We can assuredly look for more and more speed records before the year is out.

FIRST TWO "backyard" racers under the new Goodyear Trophy Race "safe" category have been announced. Art Chester, perennial small-race pilot, is readying a midget racer with a "V" tail. It is powered by a Continental C-85 and weighs only 520 lbs. empty. Has a 15 gal. fuel tank and 70 sq. ft. wing. Cost about $5,000 to build and is expected to achieve 190-200 mph top speed. Tony LeVier, equally famed National Air Racer and Lockheed test pilot, will fly *Cosmic Wind*, a more conventional type designed and built by a group of Lockheed engineers and mechanics. The tiny all-metal design weighs 800 lbs. fully loaded and is expected to attain 200 mph top speed. Another half-dozen light speedsters are being groomed in secrecy for the race, which is designed to take the danger out of the races while preserving the technical and piloting skill required.

INCREASING SIZE of the helicopter is increasing its promise as a commercial transport. Latest multi-passenger design to fly is the Kellett XR-10, a 12-place twin engine design usable as a flying ambulance plane, cargo or passenger liner. The new type is a development of Kellett XR-8 and retains its "egg-beater" intermeshing rotor system. The new design, however, is powered by two Continental aircooled engines developing 525 hp each. The engines are mounted on either side of the fuselage and drive individual rotors through shafts extending from the engine directly to the rotor head atop the fuselage.

At last, a practical baby jet—the Boeing Model 500 shown here weighs only 85 lbs. and develops 150 lbs. of thrust. The turbine wheel is 7½" dia., the entire unit is 22" in dia. and 29" long (less tail pipe)

BIG PLANES continue to make the headlines. The first commercial Boeing *Stratocruiser* made its test flight successfully. The first airplane will be retained by Boeing for CAA certification and accelerated service tests, which are expected to be completed this fall. The second plane will go to Pan American, first of 20 on order. The first Boeing B-50 has completed its early test flights and revealed some of its considerably improved performance over the

(*Turn to page* 70)

AT LAST! WHAT MODELERS HAVE LONG NEEDED!

An Up-to-Date Manual & Reference Book on Model Motors!

THERE has been a growing need for a complete, up-to-date manual and reference book on model motors to aid model builders in the intelligent use of their powerplants. MODEL MOTOR MANUAL was long and carefully planned to fill this need!

The publishers commissioned LOUIS GARAMI, widely recognized as the top expert in the field of miniature engines, in collaboration with HOWARD McENTEE (Editor of *Model Airplane News* magazine), to amass all the essential material for such a comprehensive volume. Alan Orthof, one of America's outstanding aeronautic draftsmen, was also engaged to illustrate this book with his exceptionally fine drawings.

The combined efforts of these technicians have produced one of the most authoritative and useful books in the history of model activity!

The reader is first given a thorough explanation, by text and illustration, of the function of the model motor and the ignition system. Then he is made acquainted with the actual mechanical design features now used in commercial engines, and with the manufacturing processes that produce these units—such as grinding, milling and lapping.

The authors departed from the traditional method of classifying motors by number of ports employed—they found it more logical to identify them by the means used to bring fuel into the cylinder. The practicability of this new method is proved by the fact that although many new motors have reached the market all fit readily into the categories described in Chapter 5.

Besides a comprehensive coverage of *every* phase of model motor operation, this new book presents helpful tables, charts and data, and a large photograph section of: American gas, jet and diesel engines, as well as Foreign diesels.

Technical terms are avoided whenever possible, for this book is intended for the beginner as well as the expert, both of whom will find it an invaluable aid in the intelligent use of their powerplants!

Published Sept. 2, 1947!

Only $3.00

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Packet #11PP - Fighters - all ABsmC: Republic Thunderbolt P47 38; Bell Aircobra P39C 33; Grumman Hellcat F6F 36; Curtiss P40F 37; Mitsubishi S-00 Zero 40.

Packet #12PP - Fighters:-Bell Kingcobra P-63 37½ ABsmC; Messerschmitt 109 32 ABsmC; P-38 Lightning 52 BC; Hawker Tempest 34½ ABsmC; Douglass Dauntless SBD 40 ABsmC.

Packett #13PP - World War I - all AB: Nieuport 17C.1 26½; Spad 13C.1 26; Fokker D8 26½; Fokker D7 22½; Sopwith Camel 27½.

Packet #14PP - Lightplanes - all AB: Piper Skycycle 30; Johnson Rocket 31; Globe Swift 29; Ercoupe 30; Culver V 29.

Packet #15PP - National Air Racers: Gee-Bee 25AB; Howard Ike 30 lgBC; Folkerts 20 AB; Wedell Williams 26 lgBC; Pesco Spec. 25 BC.

SCALE MODELS - Quarter inch=1 ft. plans. Detailed 3-views, rivet lines, photos, history of each plane, description and performance data.

Packet #1PP - Fighters: Lockheed Lightning P-38 13; Hawker Typhoon 10½; Focke-Wulf 190A3 8½; Spitfire IX 9½; Curtiss P40F 9½; Vought Corsair F4U1 10½; DeHaviland Mosquito 13½.

Packet #2PP - Fighters: Bell Aircobra P-39 8½; Republic Thunderbolt P-47 10½; Stormovic IL-2C 12½; Grumman Hellcat F6F 10½; Mitsubishi S-00 10; North Amer. Mustang P-51 9½; Grumman Avenger TBF1 13½.

Packet #3PP - Fighters: Northrup Black Widow P-61 16½; Hawker Hurricane 10; Hawker Tempest 10; Bell Kingcobra P-63 9½; Douglas Dauntless SBD5 10½; Bell Airacomet P-59A 12½; Messerschmitt 109G16 8½.

Packet #4PP - World War I Fighters: Fokker D7 7½; Sopwith Camel 7; Fokker D8 7; Nieuport 17C.1 6½; Spad 13C.1 6½; Albatross DVa 7½; SE5a 6½.

Packet #5PP - Bombers: Martin Marauder B-26 18; North Amer. Mitchell B-25 17; Consolidated Liberator B-24 27½; Avro Lancaster 26; Boeing Flying Fortress B17G 26.

CONTROL LINE & FREE FLIGHT - With photos, sketches and bill of materials.

Packet #1F: Knight Twister 30CL-AB; Tethered Trainer 36CL-ABC; Hep Cat 48FF-AB; Curtiss Helldiver 32CL-ABsmC; Connecticut Yankee 58FF-BsmC.

Packet #2F: Hall Racer 26CL-AB; Hill Special 20CL-AB; Gee "30" 54FF-lgAB; Culver Cadet 40CL-AB; Pusher Pursuit 24½ CL-AB.

Packet #3F: Could Be 48FF-B; Flying Lab 70FF-lgBC; Corsair 35CL-lgBC; Bob Cat 24CL-B; Copperhead 25CL-B.

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Packet #3APS: FW 190A3 5½; Me210A1 9; Me109E 5½; Me109F 5½; Fe156 Storch 8; Ju87B 7½; Me108B Alson 5½; Ar 95SEE 7; Arado 196 7½; Ju88 A6 10½; He111-haE 12½; Do215 9½; Do-17-p 9½; Bv 141B 11; Do217E 10½; Ju52/3mk 16; He 111 12½; Ju 99A1 10; Me110 9; Do26K 16; Bv 142 16; Fw 200B Condor 16; Fw 200K Kurier 18.

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WEST COAST TIPS

by JOHNNY DAVIS

WEST COAST club activities have increased rapidly, and to our way of thinking this is a healthy sign. We intend to give more and more attention to club doings as they get more and more active—so fellows, let us know what gives in your neck of the woods.

California's largest model club has just been formed and bids fair to wield a powerful weapon in the fight to achieve unity of rules and regulations. The name of this new organization is: California Association of Model Clubs. At this writing all three of the state's largest model associations form the nucleus around which the organization is built: Northern California Aeromodelers, Southern California Model Congress, and *Los Angeles Aero-Modelers*. Others of no lesser note but which do not have as many members are: the famed *Oakland Cloud Dusters*, the equally famous *Fresno Club*, the two elite San Diego clubs, the *Aeroneers* and the *Airliners*, etc.

Roy Mayes, Pres. of Northern Association of Modelers was one of the guiding lights in developing this new organization, and together with several members of the *Los Angeles Aeromodelers* and the Congress arranged a meeting in Fresno early in the summer and set up a temporary structure which was further solidified by a meeting held on the final day of the Western Open. The following minutes of the meeting at the Clark Hotel were recorded:

Secretary's report of the 2d meeting held at the All Western Open Contest in Los Angeles on June 30.

Meeting called to order at 10:15 a.m. by Temporary President, Ocie Randall. Minutes of the last meeting were approved as read.

Treasurer's report: Cash on hand $12.00.

A general discussion was started as to the best method of representation for this Association. Following the discussion, motions were carried to the following effect:

1. That the State of California be divided into 4 geographical Districts.

2. Each district shall elect 6 representatives from their district. These district representatives shall consist of two men representing each of the following categories of models: Free Flight Gas, U-Control, and Freaks, i.e., Gliders, Rubber-powered, etc.

A motion was carried that the 4 State Districts be as follows:

District No. 1—San Diego and Imperial Counties.

District No. 2—Greater Los Angeles area.

District No. 3—San Joaquin Valley Area—Bakersfield to Stockton.

District No. 4—Northern California Area.

Clubs in Border-line Areas shall be allowed to determine in which area they wish to be included.

The Association, by unanimous vote, temporarily appointed the following men to hold elections within their district for the purpose of electing permanent representatives for their district.

District No. 1

Bill Scott, 3921 Fifth Ave., San Diego 3, Calif.
Jim Saftig, 3926 Park Blvd., San Diego 3, Calif.

District No. 2.

The Presidents of the Los Angeles Aeromodelers and Southern California Model Congress:
Russ Gass, 4827 Blackthorn, Long Beach, Calif.
Dick Schumacher, 275 W. Santa Anita Dr., Burbank, Calif.

District No. 3.

Paul Nieto, Jr., 2127 Glen, Fresno, Calif.
Vern Oldershaw, 712 Knott St., East Bakersfield, Calif.

District No. 4.

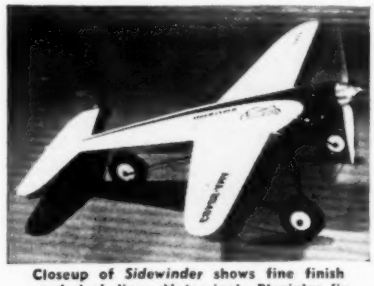
Harvey Robbers, 5610 E. 17 St., Oakland 3, Calif.
Don Foote, 816—56 St., Oakland, Calif.
Roy Mayes, 1204 Delaware St., Berkeley 2, Calif.

Border-line clubs should notify the above men immediately in regards to being included in their district.

These men have 30 days from date of this meeting in which to get their area organized and the 6 permanent representatives elected. Length of term of the permanent representatives has not yet been decided upon.

The permanent district representatives shall hold a meeting in Fresno within 60 days from date of this meeting. Representatives should notify Temporary Chairman Ocie Randall, 716 Waterman Avenue, Fresno, Calif. as to their preference for the date or dates of this meeting.

It was agreed that the following method shall be followed by each district in electing their permanent representatives. Each club that joins the Calif. Association of Model Clubs shall be allowed two votes and two representatives at district meetings.



Closeup of *Sidewinder* shows fine finish and sleek lines. Note single Plexiglas fin

District meetings and dues shall be handled as each district sees fit. District representatives will receive their instructions as to their district's desires at their district meetings. These representatives will then meet at the State meetings in Fresno, at which meetings district proposals or motions will be voted upon by all district representatives. By this method it is hoped that we can all work together and unite Calif. into one solid group, and one set of rules for all categories and phases of model airplane competition. It should also give us a very strong voice in suggesting changes in AMA Rules, in handling State-wide Contests or Elimination Contests, cooperation in setting future contest dates, and in general a much better manner of getting along with our fellow modelers in all parts of the State.

Each club wishing to join the Calif. Assn. of Model Clubs may do so upon payment of 50c entry fee. All entry fees shall be used as funds for State meetings. District expenses shall be assessed by agreement of district representatives as needed. In the event that additional funds are needed for State expenses, each district shall be assessed funds as needed.

Each club is asked to get behind this Association. We have everything to gain and nothing to lose. Let's put California out in front as the strongest and best organized State in the United States.

Meeting was adjourned at 12:30 p.m.

Respectfully submitted,
ROY MAYES, *Acting Secretary.*

(*Turn to page 67*)

Famous *Sidewinder* of Les Mac Brayer never placed less than 3rd when making an official flight. It collected all this hardware for Les over 2 year period

ESTABLISHED 1931

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Wrench
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Presto starter
50 page engine manual
WITH PLANES:
Sponge wheels,
Pro model knife
150 pg. Construction manual

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8. *FREE* coil, condenser, wrench, ignition wire, coil holder, prop, "Presto" starter and copy of Model Gas Engine Theory & Practice (50 pages) with most motors listed. $4.00 extra value at no extra cost.
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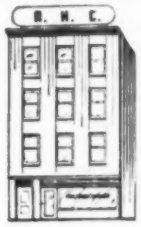

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MOTORS
(FREE: See item 8 above)

- Arden .090 (CL A) $16.50
- Marvin (CL A) 15.50
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- Forster 29 (CL B) 19.50
- Hurricane (CL B) 19.75
- Meteraft (CL B) 18.50
- Merlin (CL B) 18.00
- Rogers 29 (CL B) 15.75
- Torpedo (CL B) 18.50
- Cannon 350 (CL C) 21.50
- Dennymite (CL C) 21.50
- Ohlsson 60 (CL C) 11.95
- OK Super 80 (CL C) 21.00
- Rocket (CL C) 22.50
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- Atwood Champion (CL C) 18.00
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- Vivell 40 (CL C) 20.00
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- Drone Diesel (CL B) 21.50
- Mite Diesel (CL A) 18.95
- G.M.D. (CL C) 15.00
- McCoy 49 (CL B) 25.00
- OK 60 Race (CL C) 26.00
- Forster 99 24.75

No Premiums on Price-Fixed Items

MOTORS
(No Premiums)

- Genie 29 (CL B) 6.95
- Rogers Ram (CL B) 9.95
- New Thor (CL B) 8.95*
- New Thor Kit (CL B) 6.95
- Ohlsson 19 (CL A) 9.95
- Ohlsson 23 (CL B) 9.95

*Includes coil and condenser

MOTOR ACCESSORIES

Battery Box (all sizes) $ .40
Mogow Plastic (pan. or mod.) .40
Aero Coil (Featherweight) 2.50
Aero Coil (Quality) 3.00
Smith Competitor Coil 1.95
Arden Coil 2.50
Winston Coil 2.00
Wilco Coil 1.95
Regular Coil 1.50
Metal Condenser .45
Paper Condenser .20
Ignition Wire (6 feet) .25
High Tension Lead Wire .15
Spark Plugs (all sizes) .50
Arden Booster Jack 1.25
Switch .25
Alligator Clips .10
Vitamite Flight Battery 2.35
Vitamite Booster Batt. 5.00
Power-plus
Flight Battery 2.75
Booster Battery 3.50
House Charger 4.45
Auto Charger 1.95
Arden Flight Timer 1.85
Austin Flight Timer 1.50
Comet Flight Timer 1.00
Hillcrest Flight Timer 1.25
Universal Needle Valve .75
4-Way Plug Wrench .15
Neoprene Tubing (per ft.) .50
Spinit Starter 5.00
Aluminum Engine Mounts .50
Flo-Torque Props (8" to 14") .50
(18", 18") 1.00
Hi-Ball 9", 10", 11", 12" .50
Topping 10" Multi-pitch Prop 1.50
Topping 12" Multi-pitch Prop 1.75
Comet Props: 8", 10", 11" 12" .35 .40
Hi-Pitch Props: 8", 9", 10", 45c; 11", 50c; 12", 13", 60c; 14", 65c.
Snafu Plastic Prop 10" .75
12" .90
Topping 3 Blade Plastic Props 1.50
Sponge Rubber Wheels 2", 40c; 2 1/2", 50c; 3 1/2", 60c
Trexler Balloon Wheels 2 1/2" 60c; 2 3/4" $1.00; 3" $1.25; 3 1/2" $1.50; 4 1/2" $1.75.
Spray Gun 1.25 & 1.75
Modelcraft Plane .75
Flywheels A or B, $1.00; C, $1.50
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Midget Screw Driver .10
Hi-Tension End Clips, each .05
Tip Jacks Set .60
Jom Pump Can .75
Plug Gauge Set .15
Alum. Prop Spinners 5/8", 20c; 13/16", 30c; 1 3/8", 75c; 1 1/2", $1.00; 1 3/4", $1.00; 2", $1.25; 2 1/2", $1.50; 2 3/4", $1.75.
Presto Disc Starter .25
Bamboo paper—white, green, blue, each .10
Wood Stripper .25
Celluloid Sheet .10
Austin Tank .50
Froom Gas Tank 1.00
Winston Tank .75

FREE FLIGHT PLANES
(FREE: See Item 9 above)

For "A" & "B" Motors

Caronet 48" $2.50
Buccaneer 48" 3.50
Buccaneer 36" 1.50
Bee 48" 1.95
Brooklyn Dodger 50" 3.95
Pacer B 53" 3.95
Topper 41" 3.50
Roamer 45" 2.95
Zombie 44" 2.50
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Playboy Jr. 55" 3.25
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Stratos 42" 2.95
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Banshee Std. 50" 2.00
Wanderer 54" 3.50
Bay Ridge Mike 49" 2.00
Tarpon 54" 5.95
Runt 44" 2.50
Air Foiler 44" 3.95
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Buccaneer C. Spl. 72" 6.95
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Mercury 72" 5.50
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(FREE: See Item 9 above)

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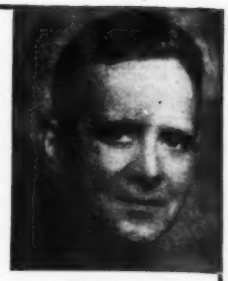

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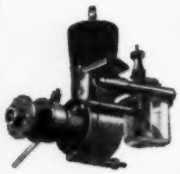
"Send 5c for a copy of our latest hobby and model list!"



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Country's leading engines

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	Class	
Airo Diesel	B	$16.50
Arden .099PB	A	16.50
Arden .099BB	A	19.50
Arden .199PB	A	21.50
Atwood	C	23.50
Bantam	A	18.50
Contestor D60	C	18.50
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*Wensen	C	20.00

*Includes Coil and Condenser.

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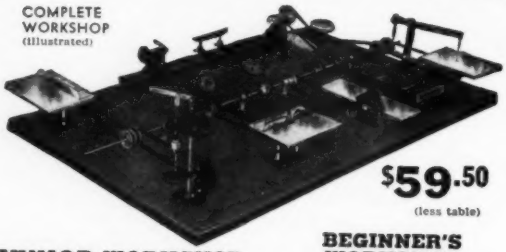

$59.50 (less table)

JUNIOR WORKSHOP

Includes Jig Saw, Circular Saw, Drill Press, Lathe, 1 Line Shaft, 2 Collars, 3 Hangers, 5 Pulleys, 5 Rubber Belts. **$34.30**

BEGINNER'S WORKSHOP

Includes Jig Saw, Drill Press, Lathe, 1 Line Shaft, 2 Collars, 3 Hangers, 4 Pulleys, 4 Rubber Belts. **$26.30**

Motor not included. 1/10 to ¼ H.P. Motor will operate any set or individual tool.

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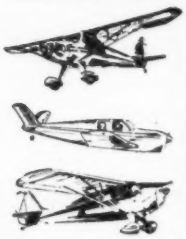

Gas Powered Silvaire $3. Rubber Powered Bonanza and Aeronca Chief $1 each

TAYLOR HOBBYCRAFT POWER TOOLS

Precision tools for your model and hobby work. You can now buy these tools separately, as well as in the money-saving workshop combinations. Expertly designed for craftsmen.

Jig Saw and 13 blades	$ 4.95
Lathe 24" bed, 4" face plate, 3" grinding wheel, grinding wheel adapter	10.95
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Circular Saw, combination rip and cross cut blade	7.95
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Collars, for line shaft, per pair	.30
Face Plate for lathe, 4½" swing	.75
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Hangers for line shaft, 3 for	1.00
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Chuck for Drill Press, spring action tool steel jaws. For any drill, round or square shank up to ¼" dia.	1.00
Pulley, die cast, 2½ O.D., with set screw	.50

FREEFLIGHTERS

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Interceptor (Comet), A&B	2.95
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Jiffy, A	1.75
Larkey, A&B	3.50
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Musketeer Standard, C	4.95
Musketeer 42", A	2.50
Mercury, C	8.50
Pacer, B&C	3.95
Pacer, C	4.95
Playboy (Baby), A	1.00
Playboy Jr., B	3.25
Playboy Sr., C	6.00
Piper Cub (Megow), B	6.95
Piper Cub (Capital), A	1.95
Piper Supercruiser, C	10.95
Runt, A	2.50
Roamer, A&B	2.95
Ranger, B	3.00
Rocketeer, A	2.95
Super Quaker, C	8.00
Stinson (Cleveland) C	17.50
Stratostreak, A	2.50
Sailplane (Comet), C	8.95
Spearhead Jr., A&B	1.95
Skyrocket, A	2.25
Stratospear, A&B	2.95
Topper A, A	3.50
Vagabond, C	5.50
Varsity, A&B	3.50
Wanderer, B	3.50
W.O.G., B	4.95
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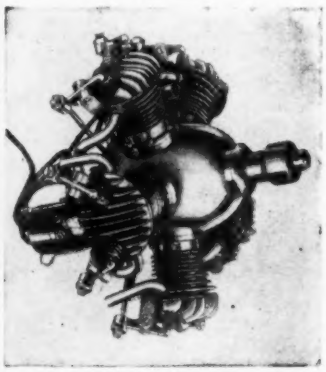
Zipper, A	1.95
Zipper, B&C	5.95



Burgess M-5 Five Cylinder Airplane Engine

Four stroke Cycle, Bore .625, Stroke .600, Displacement .92 Cubic In. Overall Diameter 5⅜", Rated ⅓ H.P., Weighs only 22 oz. **$75.00**

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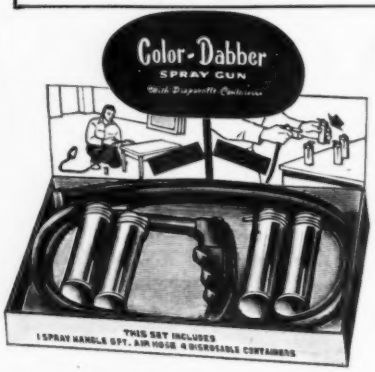
2 Bladed Polished Hardened Alum. Blades, adj. pitch	$ 8.30
3 Bladed Polished Hardened Alum. Blades, adj. pitch	11.75
M-5 Tubular Steel Engine Mount	3.50
M-5 Die cast Ring Mount	3.75

ENGINE PRICES SLASHED

	Class	Was	Now
Bullet	B	$15.00	$12.75
Cannon 300	B	19.75	12.50
Cannon 358	C	21.50	13.50
*Fleetwind	C	24.75	15.00
*Hurricane	B	19.50	12.50
*Merlin	B	21.50	12.50
*Rogers 29	B	15.75	9.95
*Rogers 35	C	16.95	12.50

*Includes Coil and Condenser



COLOR DABBER SPRAY GUN KIT $2.50

For hobby, shop, industrial touch-up jobs. Operates from any compressed air source up to 35 lbs. Can be attached to automobile spare tire for use with home model work.

FAST—LOW COST—SIMPLE TO USE

Fine atomized spray gives even coat with no experience required.

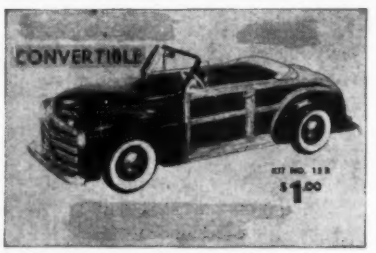
KIT complete with Spray Gun, 6 feet of air hose, 4 Color-Dab disposable containers. $2.50

Additional containers only 25c each.

RITE PITCH PROPS

8, 9, 10 or 11 inch.....50c

12, 13 or 14 inch.....60c



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ACE MODEL AIRPLANE COMPANY

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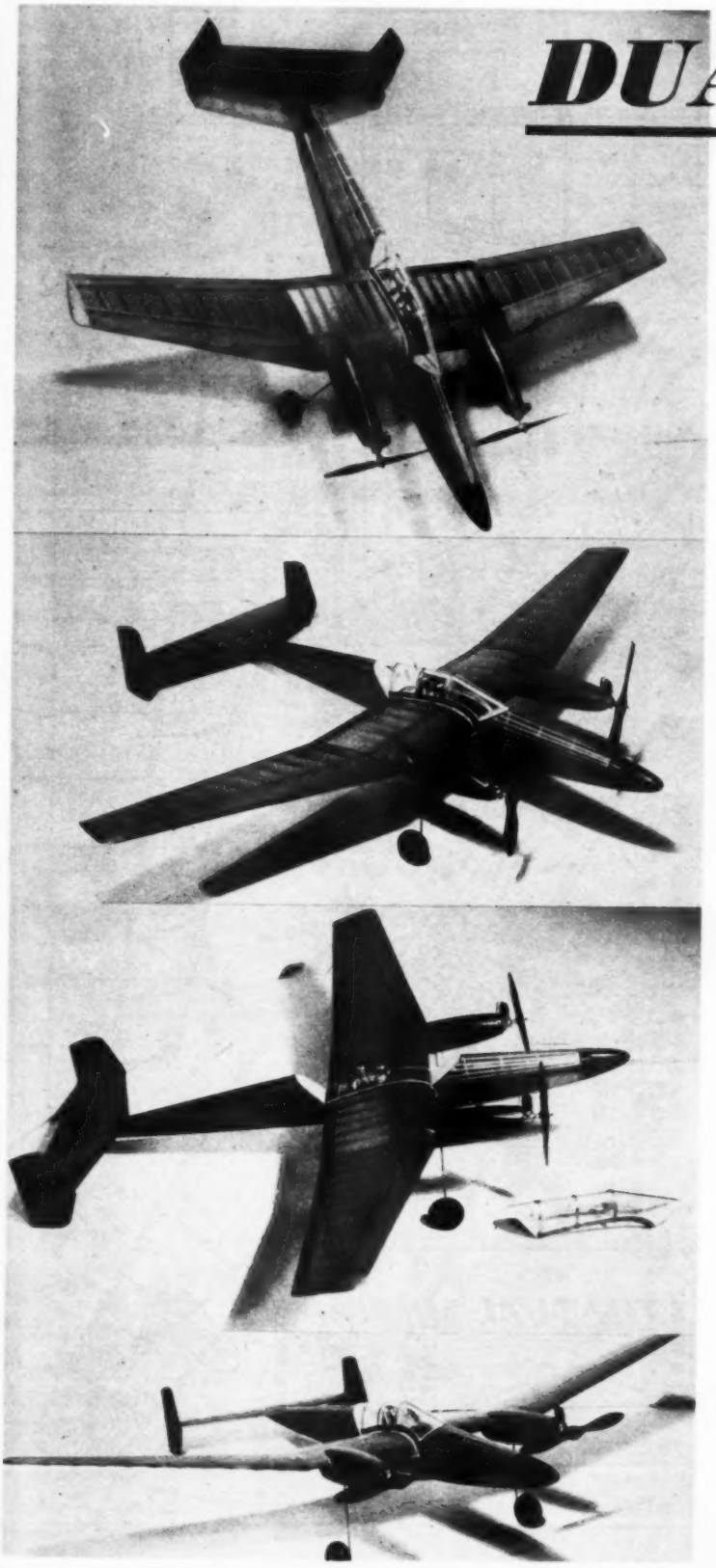


DUAL-AIR

by **FRANK EHLING**

A highly practical twin motor ship using CO_2 power

THE *Dual-Air* illustrates one of the best ways that CO_2 engines can be used because it will turn in one fine flight after another. The ship will fly with two cartridges, as the distributor will run the two engines for the same length of time and with the same power.

It was originally designed to use a rechargeable fuel tank which would fit in the fuselage, fastened beneath the wing centersection. Such a tank had been used on a previous twin CO_2 model and proved a huge success; so much so in fact that the ship (and more important, that special tank) was lost O.O.S. in a recent contest.

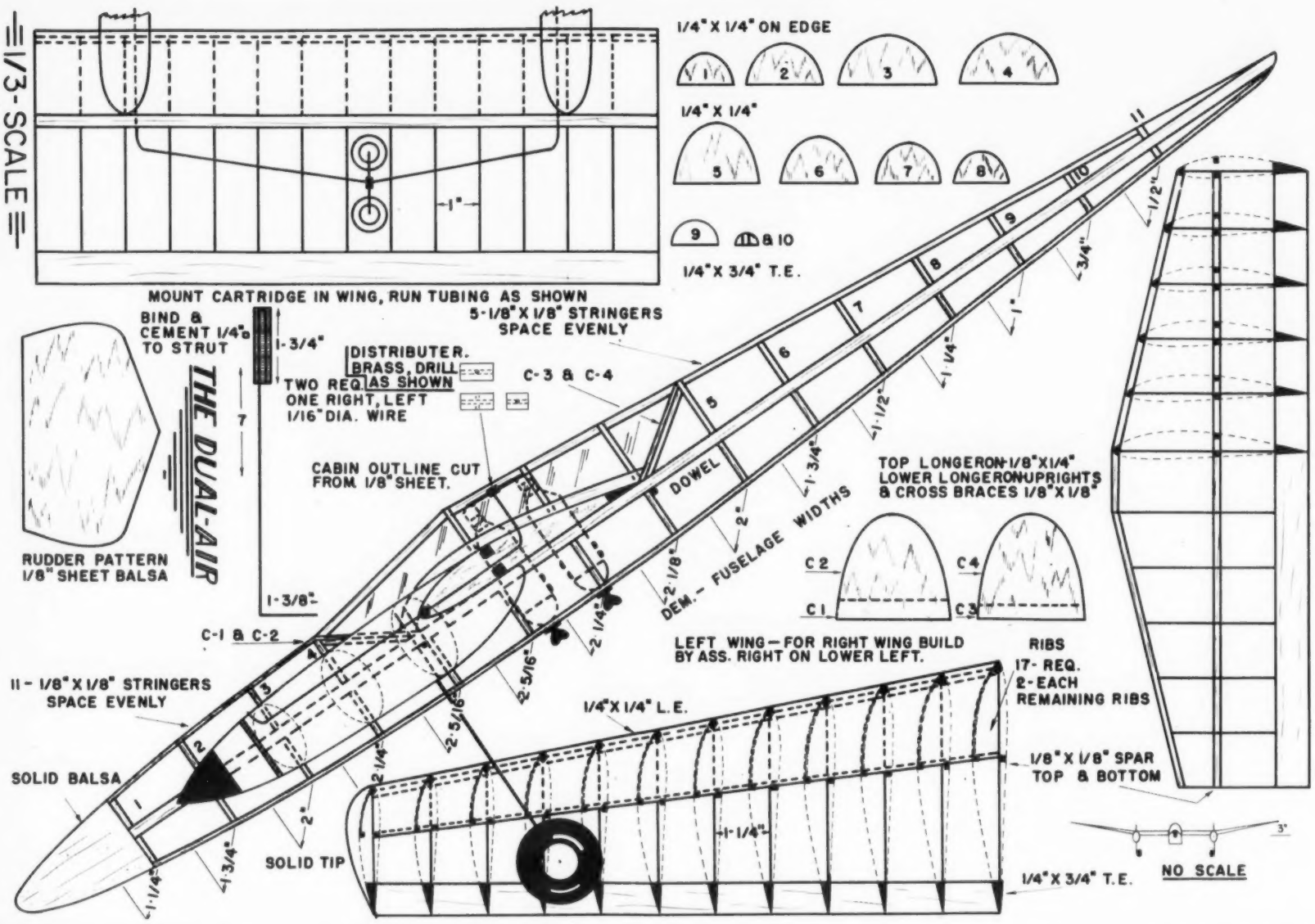
A second tank was made and was, we thought, identical with the first. On a bench test however it exploded (we are still shaking!). While we feel that a rechargeable tank is the coming thing, much more research in materials and methods of fabrication must be done to assure safety. Meanwhile we have found the model to be a highly satisfactory flier with the dual cartridge hookup shown here.

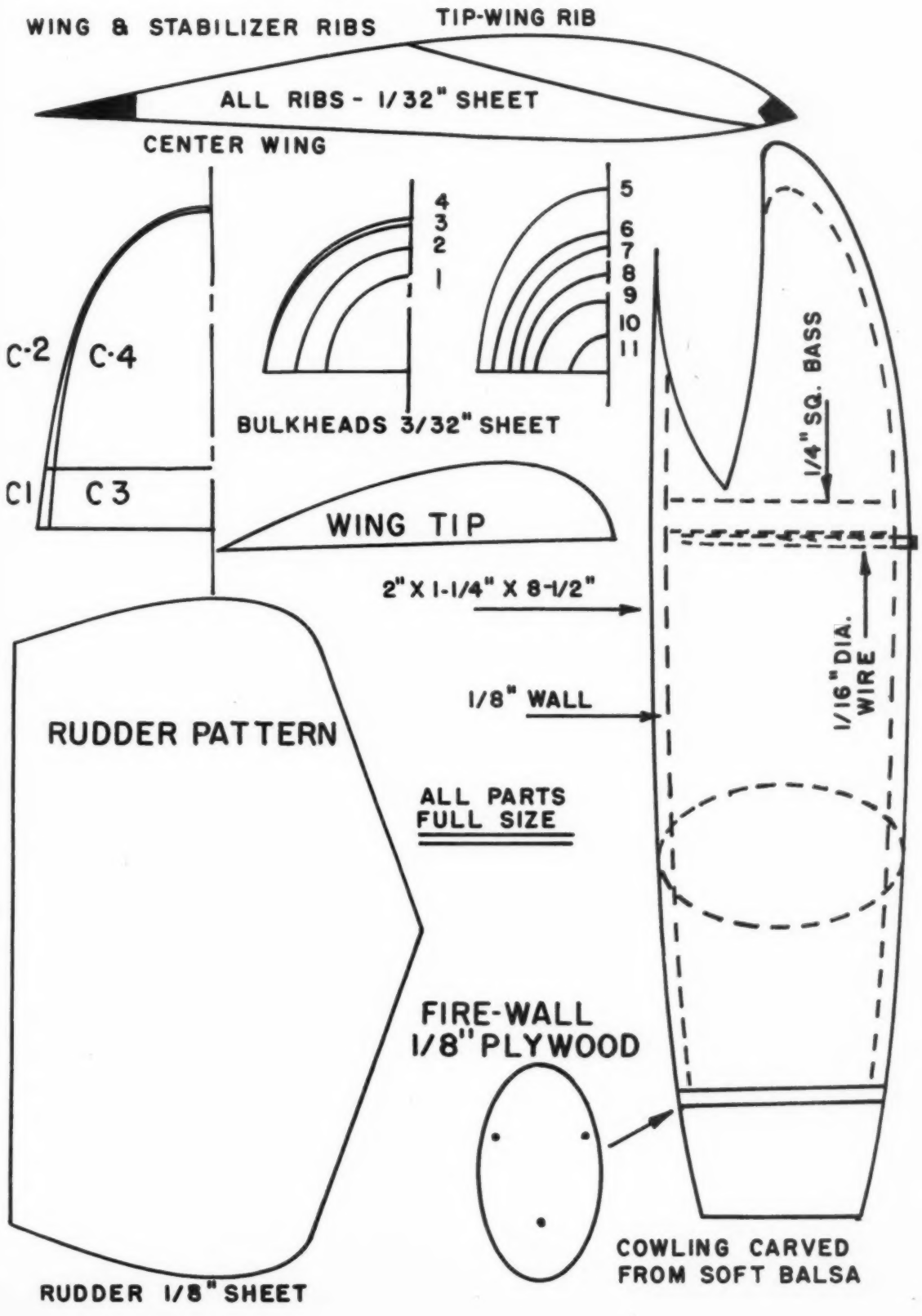
The cabin was made in one piece and is removable so the cartridges can be refilled easily. The wing nuts on the cartridge holders extend through the bottom of the fuselage and can be turned at will when ready to fly. The wing is held in place with a rubberband; this is handy when the ship hits an object because the wing can shift and ordinary collisions will not ruin the model.

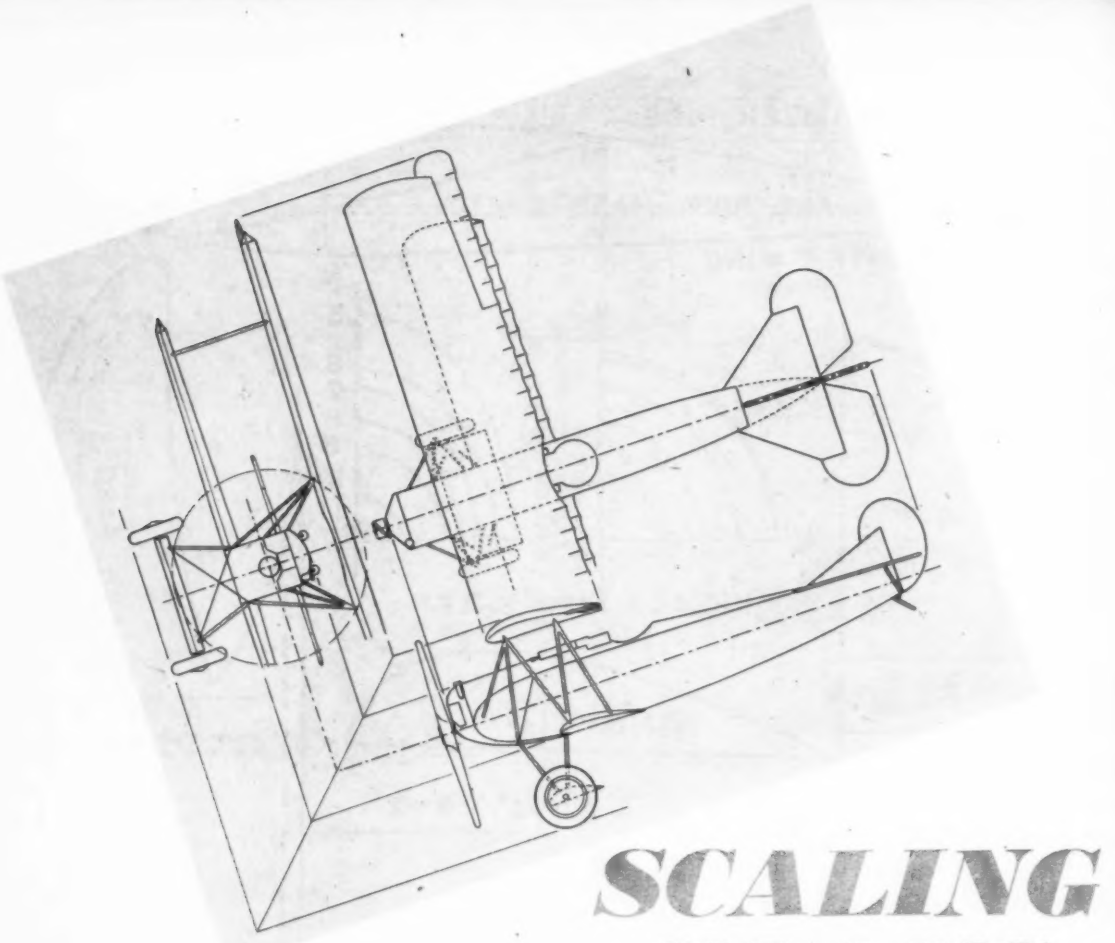
CONSTRUCTION—The fuselage is made in much the same manner as any other. However, the top longerons are 1/8" x 1/4" while the lower ones and the uprights and crosspieces are all 1/8" x 1/8"; this is done to keep the fuselage from going out of line and to assure a good base on which to mount the wing and tail. The fuselage has flat sides and a flat bottom but the top is built up to a rounded section with formers. The top longerons show on the fuselage drawing as the wide strip along the centerline. After the sides are cemented together and the formers cut out and cemented in place, the stringers can be added. These are laid atop the formers, spaced evenly and held in place with pins, then cemented. Add the nose block and sand the entire fuselage.

The wing is next; the ribs are cut out by using a centersection rib as a pattern. All centersection ribs are the same, but ribs in the outer wing panels are each different. Every successive rib, following the inner one (which is the same as those in the centersection), can be shaped from the next larger one by trimming it to proper length and shaving a bit off top and bottom. Assemble the centersection using 1/4" sq. for the top and bottom spars as this part of the wing has to support the engines as well as the gear. The leading edge of the entire wing is of 1/4" sq. strip, edge upward. Undercut the upper nose of the ribs as far back as the spar as shown

(*Turn to page* 79)


1/3-SCALE
1"
1/4" X 1/4" ON EDGE
1
2
3
4
1/4" X 1/4"
5
6
7
8
9
& 10
1/4" X 3/4" T.E.
MOUNT CARTRIDGE IN WING, RUN TUBING AS SHOWN
BIND & CEMENT 1/4" TO STRUT
1-3/4"
DISTRIBUTER. BRASS, DRILL
TWO REQ. AS SHOWN ONE RIGHT, LEFT
1/16" DIA. WIRE
5-1/8" X 1/8" STRINGERS SPACE EVENLY
C-3 & C-4
THE DUAL-AIR
7
RUDDER PATTERN 1/8" SHEET BALSA
CABIN OUTLINE CUT FROM 1/8" SHEET.
DOWEL
1-3/8"
C-1 & C-2
TOP LONGERON 1/8" X 1/4"
LOWER LONGERON UPRIGHTS & CROSS BRACES 1/8" X 1/8"
C2
C4
C1
C3
DEM. - FUSELAGE WIDTHS
2 1/8"
2"
2 1/4"
2 5/16"
LEFT WING — FOR RIGHT WING BUILD BY ASS. RIGHT ON LOWER LEFT.
RIBS
17- REQ.
2- EACH REMAINING RIBS
11 - 1/8" X 1/8" STRINGERS SPACE EVENLY
1/4" X 1/4" L.E.
1/8" X 1/8" SPAR TOP & BOTTOM
SOLID BALSA
SOLID TIP
1-1/4"
1-3/4"
1-1/4"
1/4" X 3/4" T.E.
NO SCALE
3"
1/2"
3/4"
1"
1 1/4"
1-1/2"
1-3/4"


WING & STABILIZER RIBS
TIP-WING RIB
ALL RIBS - 1/32" SHEET
CENTER WING
C-2
C-4
C1
C3
4
3
2
1
5
6
7
8
9
10
11
BULKHEADS 3/32" SHEET
WING TIP
2" X 1-1/4" X 8-1/2"
1/4" SQ. BASS
1/16" DIA. WIRE
1/8" WALL
RUDDER PATTERN
ALL PARTS FULL SIZE
FIRE-WALL 1/8" PLYWOOD
COWLING CARVED FROM SOFT BALSA
RUDDER 1/8" SHEET



SCALING PLANS

PART ONE

There are many ways of enlarging plans—study this detailed article and learn how

by PETER M. BOWERS

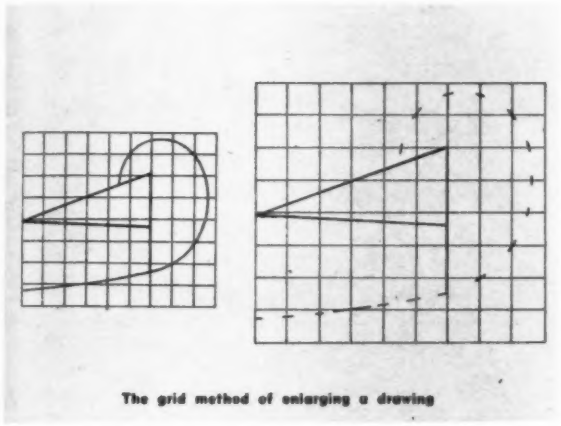
THE very first problem that confronts a scale model builder is that of obtaining suitable plans. While there are many on the market, supplied in kits or for sale directly from model companies, the industry cannot possibly supply plans for every existing airplane. Although they may have a plan of the model desired, it may not be the proper size.

Solid scale models in this country are pretty well standardized at 1/4 inch to the foot; that is, 1/4 inch on the model corresponding to one foot on the real plane. In England the scale favored is 1/6 inch to the foot. In the larger sizes devoted to flying scale there are no standards, some companies designing their models to a given scale such as 3/4 inch to the foot, while others limit their models to one size, 20 and 24 inch wingspans being popular.

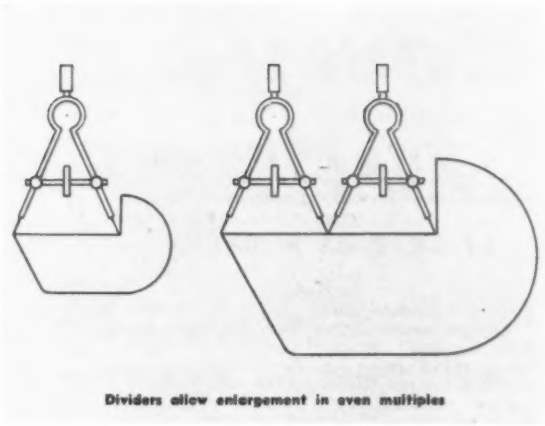
The modeler who wishes to build a plane for which readymade plans are not available must therefore make his own. There is a wealth of source material available in the general aviation press, three view drawings of practically all new military and commercial types appearing as soon as the plane itself is announced or removed from the restricted list. "Directory" issues of such magazines as *Aero Digest*, *Aviation*, and *Western Flying*, published annually, carry dozens of these drawings, as do books like the *Aircraft Yearbook* and *Jane's All the World's Aircraft*. However, the plans in these works are not drawn up with the model builder in mind. Not only are they quite small, seldom exceeding 2 or 3 inches in span, but they are not fitted to any standard scale that will permit easy enlarging, as are the plans prepared especially for such purposes by MODEL AIRPLANE NEWS. It is generally possible, though, to set a scale to these drawings, since such important dimensions as span and length of the plane are given in the accompanying text.

There are many ways of enlarging small three views into practical working model plans other than by scaling the drawing; and while not all are completely satisfactory from the standpoint of accuracy, the constant modeler will no doubt have occasion to use them all at some time in his career. The simplest, and one widely used, especially when drawings of historical types are found in the files of the Public Library, is the "photostat." This process is similar to photography and differs from it in that a paper negative is used. Since the resulting image is viewed from the emulsion side of the negative instead of through it, as in the case of the photographic negative, a prism is used in conjunction with the lens to reverse the image and have it faced properly on the finished print. This print is reversed in tone from the original: black lines on white paper appear as white on black. This is not a serious drawback for the draftsman who can save money by ordering a photostat *negative* instead of a *positive*. However, if supplementary photographs are being photostated at the same time, in addition to the plans, it is best to have them made *positive*. This is done by placing the finished photostat *negative* in front of the camera and photostating it, just as the original drawing was photostated, with the result that the second print is the reverse of the first and identical in tone to the original drawing.

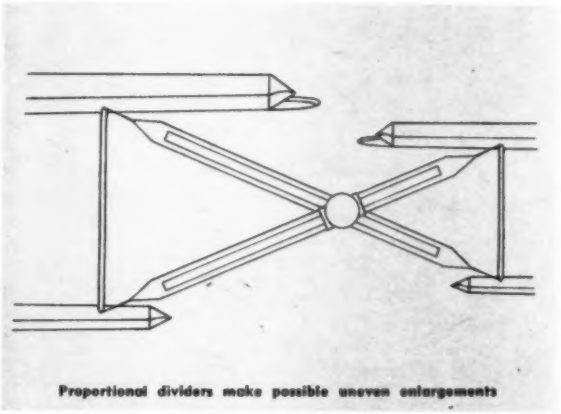
It is possible during this process to have the drawing enlarged to various sizes, although most libraries that maintain photostat services prefer to make one-to-one copies, two-to-one, or other simple ratios that the machine can be easily set to. Photography, on the other hand, permits much more exact dimensioning of the final print; special high contrast copy film is used, which makes the black lines of the original drawing stand out sharply from the white background, and being a fine-grain celluloid negative instead of a coarse paper one, the resulting print is much sharper than



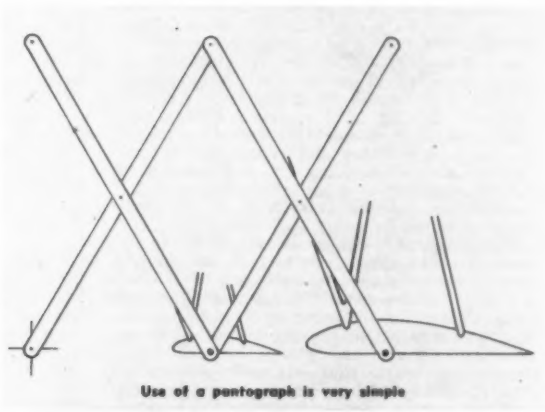
The grid method of enlarging a drawing



Dividers allow enlargement in even multiples



Proportional dividers make possible uneven enlargements



Use of a pantograph is very simple

the photostat. By putting the negative in an enlarger, it is possible to turn out any size print desired. However, because of the greater detail involved and the extra time and hand work, photography is a much more expensive process.

Despite their relative simplicity as a result of having only one or two steps between the original and the final plan, both photostat and photography have one great disadvantage from the model builder's point of view. The sensitized papers used in each process are developed in liquid solutions and are therefore subject to changes of dimension. Every modeler is familiar with the process of water-spraying the covering tissue of a model to shrink it, and he can readily understand that photographic paper, which is completely immersed in not one but several liquids, is not apt to come out the same size it went in. If this shrinkage were uniform the disadvantage would not be as great as it is, but photographic paper like covering tissue has grain, and is therefore subject to greater shrinkage in one direction than in another. The modeler who has had drawings photostated or photocopied, therefore, will do well to make careful measurements of the original drawing in two directions against which he can check the final prints. Photostats have a compensating factor when both steps are taken and a positive print is turned out. By laying the grain of the paper for the second print at right angles to the grain of the first print, the distortion due to soaking can be cancelled out to a great extent.

Changes of dimension in the original drawings may have occurred before they were ever reproduced for model work. Manufacturers often send photographic copies of three views to the magazines rather than original ink drawings or metal-plate reproductions, with the result that the plans are inaccurate before the magazine prints them. Even the modeler who works from blueprints obtained directly from the manufacturer is at a disadvantage, because blueprints are also developed in liquids or liquid vapor and therefore also subject to distortion. It is a cardinal rule in all construction work that blueprints are for *reference* only, never to be scaled.

Ozalid prints are made from tracings same as blueprints, and are developed in a machine that processes them with moist vapors, so they too are subject to distortion, though the dimensional changes here are usually negligible. However, this process requires that the original be a translucent or transparent material, and further, no size changes can be made.

Projecting the three view directly onto a large sheet of paper by means of a Magic Lantern and tracing the projection with a pencil is an accurate method of enlargement if the machine is adjusted and aligned properly; but this equipment is not readily available to the average model builder.

A further method of reproducing drawings while enlarging them at the same time is by means of a pantograph. Practically everyone has seen or used one—a wooden or metal linkage that connects a pencil to a pointer which is used to trace the small drawing, the pencil then reproducing it in a previously determined enlargement, the whole assembly pivoting about a fixed point that is in line with the pencil and the tracing point. The usual cheap schoolroom model possesses neither the accuracy nor the degree of adjustment necessary for model work. True draftsman's pantographs, capable of hairline accuracy and precise enlargement, are expensive instruments beyond the reach of all but a few modelers. Cheaper wooden varieties, accurate enough for roughing out working plans, can be had in most stationery or artist's supply stores for a few dollars, although their cost is hardly justified for the occasional builder.

The final method, and the one most universally used, is the complete redrawing of the plan in the size desired. Again, several methods are available, varying in accuracy. The simplest but least accurate is the graph, the original drawing being covered with a network of equally spaced lines that form squares, while similar squares corresponding to the desired degree of enlargement are laid out on the working plan. Using fixed points on the original plan as references, the laborious process of matching the lines square for square begins. Since no measurements other than those of the two sets of squares are involved, the process is almost entirely one of "eye," the draftsman having to approximate the actual point at which a line crosses the side of a square, and determine, again by approximation, the matching point in the corresponding square. This approxima-

(*Turn to page 76*)

design forum

BY CHARLES H. GRANT

SINCE U-control model flying has become popular, many model fliers feel that free flight is passé. In fact, if you wish to start a hot argument among a group of model builders just hint that free flight is much more interesting and scientific than U-control. Apparently many are making the mistake of those who try to compare Washington and Lincoln—they just cannot be compared. Like Washington and Lincoln, free flight and U-control are valuable and interesting, each in a distinctive way.

Let us scan the contributions of each of these two fields of model activity. The first problem in free flight model designing, building, and flying is—stability. The model, to fly any distance, must have complete flight stability, resisting disturbing forces and recovering normal flight balance when displaced. If a model does not do this it *cannot fly*. So the free flight modeler must know everything in the book about stability.

The study and application of stability, naturally, is not simple. It is true that stable models can be created by following a few simple rules. Some are satisfied with doing merely this. Others are intrigued by the mysterious reactions of flight and are drawn into the study of the more scientific side of model flying (sometimes against their will and better judgment). When this happens to a model builder, it is said that he has been bitten by the aviation bug. From that time on he usually does nothing but sleep, eat and talk aviation, with the result that he acquires a great deal of fundamental knowledge about airplanes, how they are designed, built and flown, but at the expense of hours of lost sleep.

When the problem of stability has been completely solved in free flight model flying, then efficiency may be considered; different wing sections may be tried, the design may be refined to provide better streamlining, structure may be improved. These, as well as problems of stability, tend to prompt thought and study and thereby train model builders to solve many of the same problems that confront large airplane designers. It is not child's play but a man's size job, for instance, to work out an efficient free flight gas model of *original* design.

Let us take just one problem in stability as an example of the knowledge required to handle some of these design problems. One of the most vital factors in free flight is longitudinal stability. In the early days when twin pusher models were the style, this type of stability was of little concern. A model was perfectly stable in flight with one wing stuck at the front end of the frame and a larger wing placed near the propellers at the rear. The front wing was set 2 to 3 degrees more positive than the rear. This was a simple arrangement and it provided many out-of-sight flights. Here model builders had no worry about longitudinal stability. Adjustments were made by moving the rear wing forward or back, and regardless of the adjustment a fair flight was usually obtained.

Some designers ventured into the field of tractor model design and immediately ran into trouble. They faithfully copied the proportions of full scale airplanes and wondered why their models would not perform with any degree of

(*Turn to page* 44)

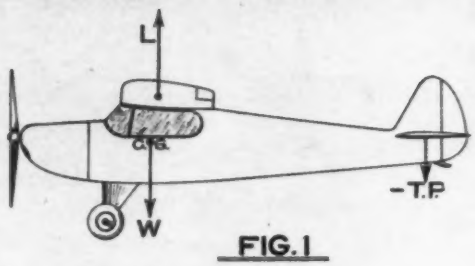


FIG. 1

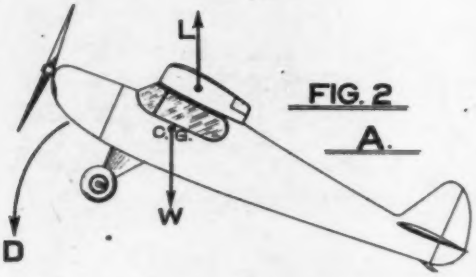
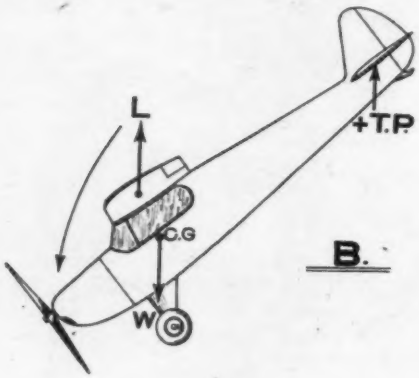


FIG. 2
A.



B.

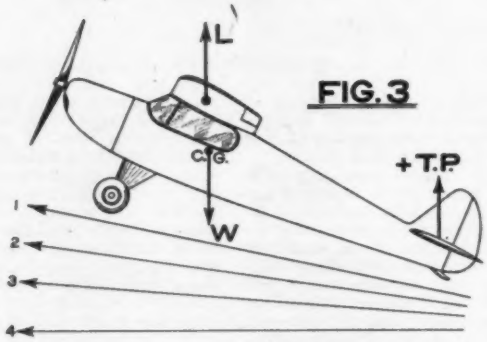


FIG. 3

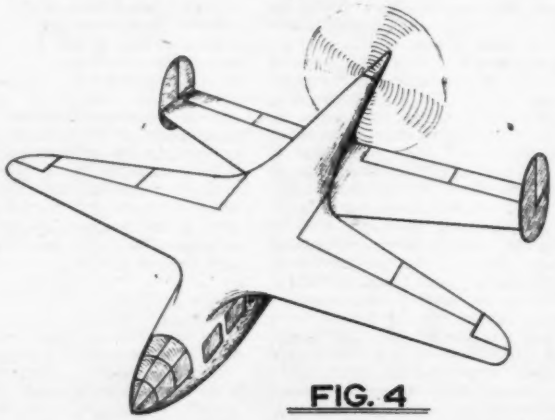


FIG. 4

by **NOBLE D. CARLSON**

Simple enough to be called a beginner's model, this glider has given contest performance

LOST LUMBER III

HERE'S a glider that fits that small space left in an attic already crowded with models, and one which you'll take out to fly more often than the rest. For the modeler of experience who has found his large gliders continually cracking up, especially if he has limited flying space, *Lost Lumber* fills a definite need. For the beginner, its extreme simplicity of construction speaks for itself.

Not created primarily to win contests, *Lost Lumber* has proven itself capable, as the first two models of this design are now in someone else's model collection, both lost from sight over the treetops at 300 feet, in the same thermal, over the same road, with what I suspect to be the same boys churning away (also out of sight) in the same general direction. *Lost Lumber* incorporates a few changes found necessary after building "I" and "II."

Lost Lumber's main good points are its high ratio of flying fun to building time, its well-disciplined behavior on the high-start (elastic tow), and its ruggedness. *Lost Lumber* was twice re-covered with tissue before any repairs to the framework were necessary.

Since you probably want to know how it flies before you build it, info on its airborne qualities follows, before we get into details of construction.

One warning—don't try to launch it by footwork alone—the wing loading is too high. Use the "High-Start"—30 ft. of 1/8" flat rubber and 70 ft. of strong thread or light string. This will take your glider up to the standard 100 ft. contest height. *Lost Lumber* goes up fast, describing a vertical arc, and passes over the stake to which the rubber end of the elastic tow is fastened, with plenty of speed to spare unless the wind into which it is launched is very strong. If adjusted properly it will gain several more feet of altitude in a climbing turn, as soon as the towline has released. Its even flight attitude, when properly balanced, is a joy to see.

First enlarge the wing and stabilizer plans from the drawings, following the dimensions given. All other parts are actual size and may be traced directly on the balsa. Make the wing and stabilizer first, so they will dry while you work on the remainder. Cut out 20 wing and 9 stabilizer ribs. Note that the stabilizer is made of one piece with a rib in the center, thus the uneven number of ribs. The wing is made in two sections, left and right, with a rib at each inside end so that when joined at the proper dihedral angle there are two ribs at the center, hence the even number of ribs.

Draw two parallel lines 3 3/16" apart; these represent leading and trailing edges. Draw another line between—one inch from the leading edge line. This is the front edge of the spar. Space the ribs at 1 1/2" intervals. That's all there is to it.

Make the stabilizer plan the same way, but with leading and trailing edges 2-3/4" apart. Front edge of the stabilizer spar is 1" from the leading edge, as in the wing. To make the wing and stabilizer framework, first cover the plan with waxed paper, then pin the trailing edges and spars in place, cementing the ribs to them. When dry, add the leading edges and tip former. Trace the boom upright on 1/16" medium balsa sheet and cut to outline. Cut the top piece of the "T" boom, tapering it from 1/2" at the front end to 5/16" at the rear, and cement it in place on the upright so that the "T" is formed. Assemble the rudder parts, all of which are full size on the plans.

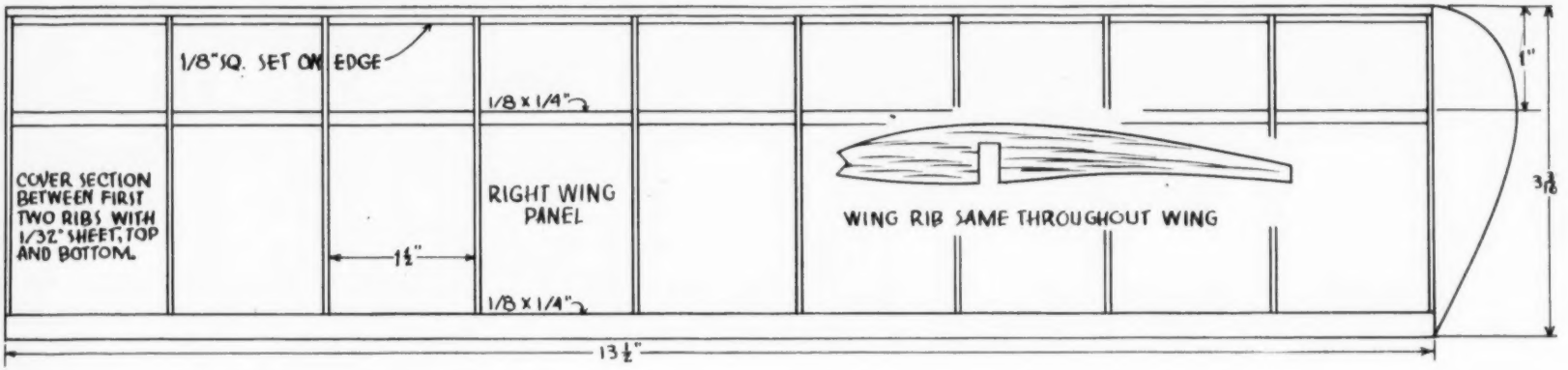
Now start on the pod by tracing top and side outlines on the block of balsa from which it is to be carved. If you use two blocks to start, lightly cement them together with just a drop or two of cement. Saw along the top view first, keeping the excess on each side in one piece so they can be pinned or lightly cemented back on again. Replace them, cut along the side outline, then remove and discard all the excess. If you are skillful at whittling, you need not use outside templates in order to insure carving to an exact crossection but may do it by eye alone. When you have finished the carving use rough sandpaper to take away the bumps; but don't use fine sandpaper until the pod is hollowed, as you may ruin a good sanding job when you rest the halves of the pod on the work table to hollow them out.

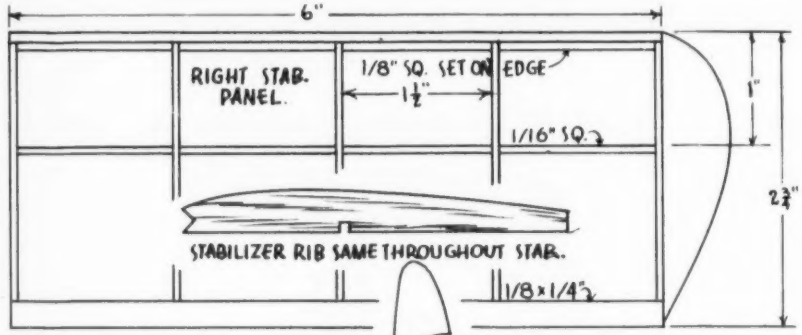
Now, providing all the parts are made, the glider is ready to assemble. First, cement both sides of the pod together, sandwiching 2 1/2" of the upright of the "T" boom between them. The crosspiece of the "T" boom rests on top of the pod. Cement stabilizer and wing in place to the "T" boom, with 1 1/2" dihedral under each wingtip, and with a small 1/8" thick block under the trailing edge of the stabilizer. for the proper incidence ratio between wing and stabilizer.

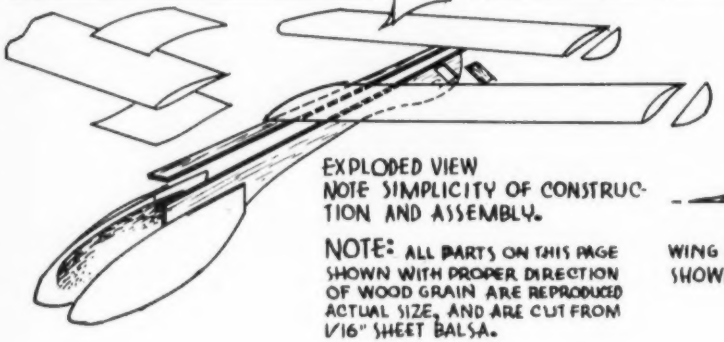
While waiting for them to dry, paper the rudder on both sides with tissue. Now add the 1/32" sheet to top and bottom surfaces of the wing between the first and second wing ribs. The lower sheet butts against the "T" boom crosspiece, and cement is liberally applied at the joint, as this gives the joint much of its strength. Now paper the stabilizer and wing, then cement the rudder in place to the "T" boom directly over the stabilizer, being careful not to cement rudder and stabilizer together. Then, in the event of breakage, one part can be removed without removing the other.

Lost Lumber is now finished except for any decorating you may wish to do. Test glide it. You may find it necessary to add weight to the nose to get a glide without "galloping". The towline hook is shown in the position found to be the best for all around use. The better glider fan will want to be on the safe side by using two hooks, one a quarter inch to the rear of the one shown, for launching in calm weather; and another one a half-inch forward of the one shown, for launching into a strong wind. Use the paper trim tab to adjust so it will climb to the top of the tow without banking away to either side.

Now bend the tab to the right enough to adjust for large, right-hand circles. To counteract this right-banking tendency while the glider is being towed upward, as you must in order to insure attaining the full height of the tow, allow the wind to blow slightly from the right as well as from the front when you launch it. Now *Lost Lumber* will climb to the full height, and once there will glide in large circles so that it tends to remain over one spot, rather than flying beyond recovery.

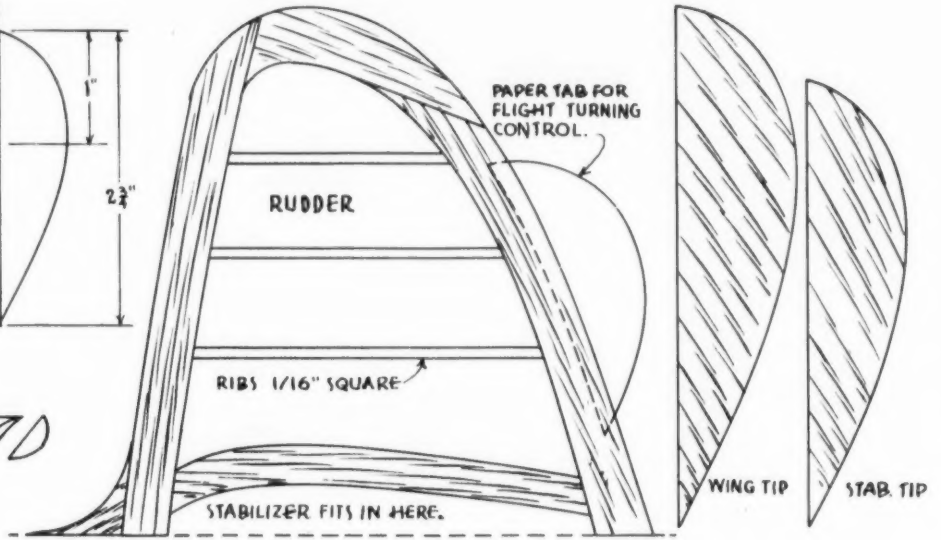






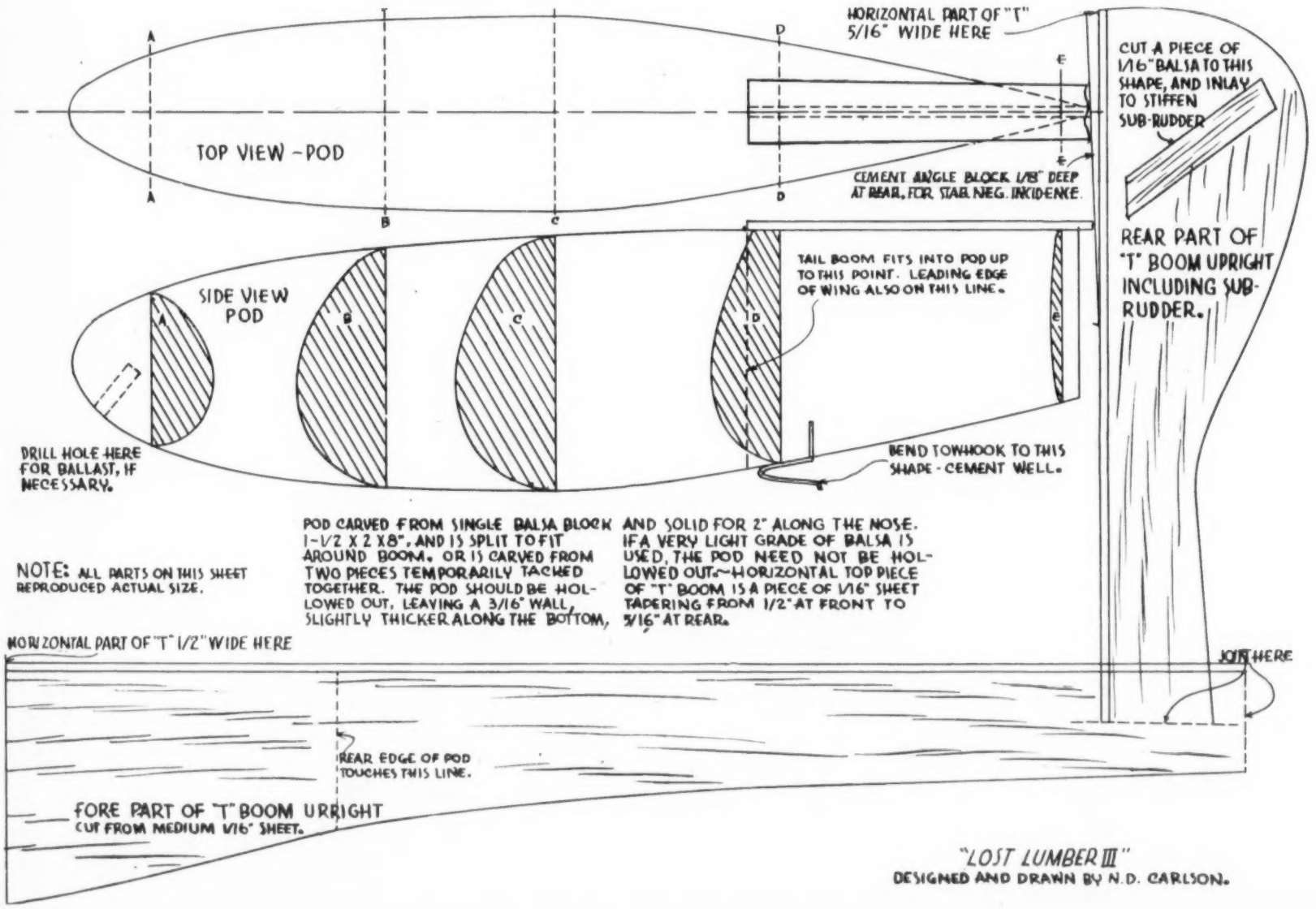
EXPLODED VIEW
NOTE SIMPLICITY OF CONSTRUCTION AND ASSEMBLY.

NOTE: ALL PARTS ON THIS PAGE SHOWN WITH PROPER DIRECTION OF WOOD GRAIN ARE REPRODUCED ACTUAL SIZE, AND ARE CUT FROM 1/16" SHEET BALSA.



WING AND STABILIZER PLANFORMS SHOWN 2/3 ACTUAL SIZE.

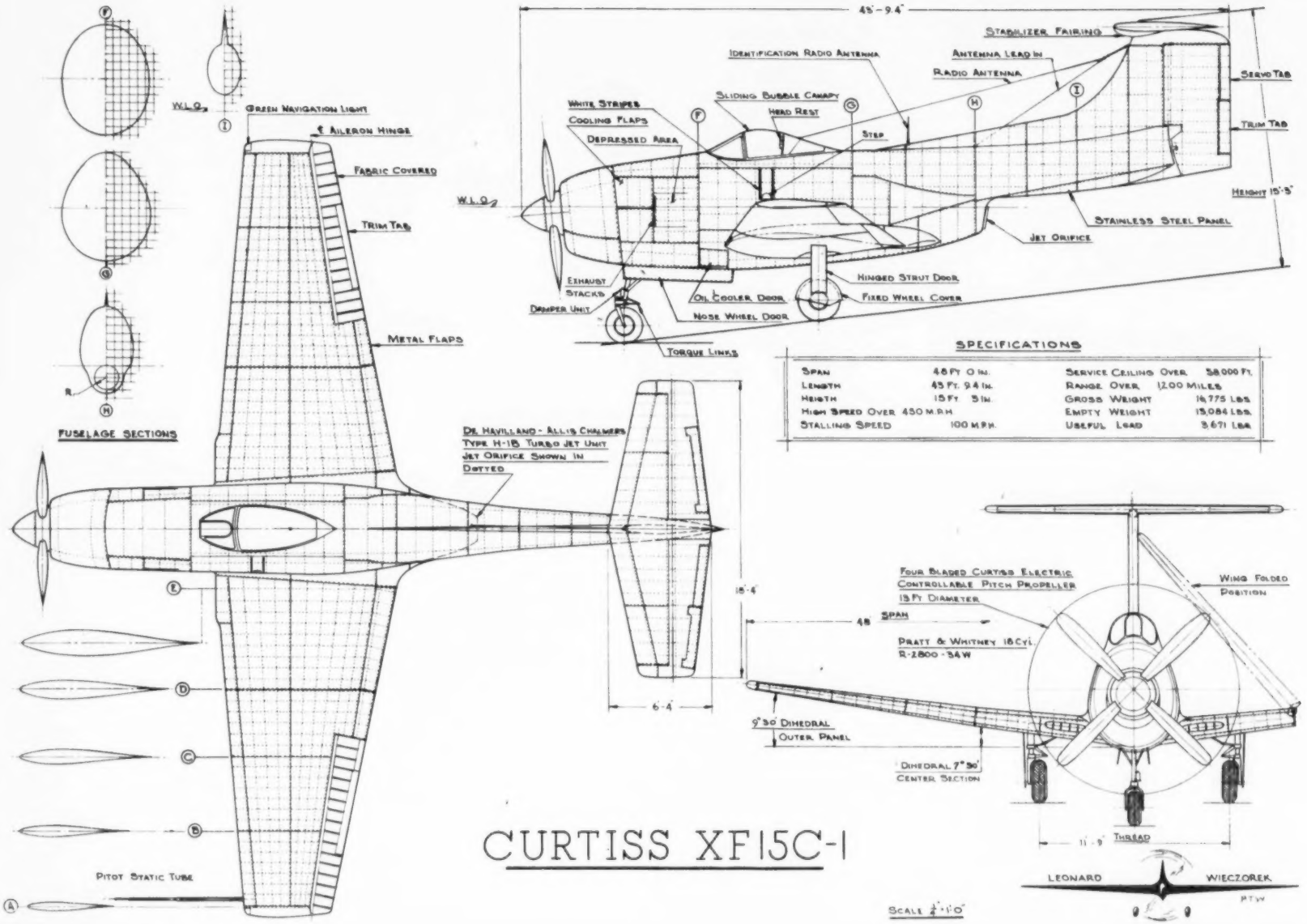
"LOST LUMBER III"


TOP VIEW - POD
HORIZONTAL PART OF "T" 5/16" WIDE HERE
CUT A PIECE OF 1/16" BALSA TO THIS SHAPE, AND INLAY TO STIFFEN SUB-RUDDER
CEMENT ANGLE BLOCK 1/8" DEEP AT REAR, FOR STAB. NEG. INCIDENCE.
REAR PART OF "T" BOOM UPRIGHT INCLUDING SUB-RUDDER.
SIDE VIEW POD
TAIL BOOM FITS INTO POD UP TO THIS POINT. LEADING EDGE OF WING ALSO ON THIS LINE.
DRILL HOLE HERE FOR BALLAST, IF NECESSARY.
BEND TOWHOOK TO THIS SHAPE - CEMENT WELL.
HORIZONTAL PART OF "T" 1/2" WIDE HERE
JOIN HERE
REAR EDGE OF POD TOUCHES THIS LINE.
FORE PART OF "T" BOOM URRIGHT
CUT FROM MEDIUM 1/16" SHEET.

NOTE: ALL PARTS ON THIS SHEET REPRODUCED ACTUAL SIZE.

POD CARVED FROM SINGLE BALSA BLOCK 1-1/2 X 2 X 8", AND IS SPLIT TO FIT AROUND BOOM. OR IS CARVED FROM TWO PIECES TEMPORARILY TACKED TOGETHER. THE POD SHOULD BE HOLLOWED OUT, LEAVING A 3/16" WALL, SLIGHTLY THICKER ALONG THE BOTTOM, AND SOLID FOR 2" ALONG THE NOSE. IF A VERY LIGHT GRADE OF BALSA IS USED, THE POD NEED NOT BE HOLLOWED OUT.—HORIZONTAL TOP PIECE OF "T" BOOM IS A PIECE OF 1/16" SHEET TAPERING FROM 1/2" AT FRONT TO 5/16" AT REAR.

"LOST LUMBER III"
DESIGNED AND DRAWN BY N.D. CARLSON.



CURTISS XF15C-1

SCALE 1/4"=1'0"

SPECIFICATIONS

SPAN	45 FT 0 IN.	SERVICE CEILING OVER	38,000 FT.
LENGTH	45 FT. 9.4 IN.	RANGE OVER	1,200 MILES
HEIGTH	15 FT. 5 IN.	GROSS WEIGHT	16,775 LBS.
HIGH SPEED OVER	450 M.P.H.	EMPTY WEIGHT	13,084 LBS.
STALLING SPEED	100 M.P.H.	USEFUL LOAD	3,671 LBS.

PLANE ON THE COVER

CURTISS XF15C-1

THE composite-powered fighter offers the maximum allround performance of any type yet tested and, as such, has attracted intensive interest of Navy officers and engineers. The Army fighter must have a high top speed, and all other considerations are of secondary importance. Assuredly it must possess a high rate-of-climb, long range and a high degree of maneuverability; but these things are subordinated to maximum speed, therefore the Army has pressed the development of the turbojet fighter.

The Navy, on the other hand, does not lay maximum stress on top speed. Because the Navy fighter must operate from a carrier at sea, a number of other considerations of equal or even more importance than sheer top speed enter the design picture. The Navy fighter must have a large radius of action; that is, it must be able to fly a considerable distance, engage in action with the enemy if required, and return this distance with safety. This demands first, an economical powerplant that uses fuel slowly; second, a large fuel supply to keep the engine running; third, a high cruising speed to cover the maximum distance on a given amount of fuel. The fuel capacity is limited by size and weight of the airplane, which limitations are common to both branches of the service. But the high fuel consumption of the turbojet engine, roughly twice that of the reciprocating engine, is a strong drawback to its use in a Navy fighter as the principal source of power.

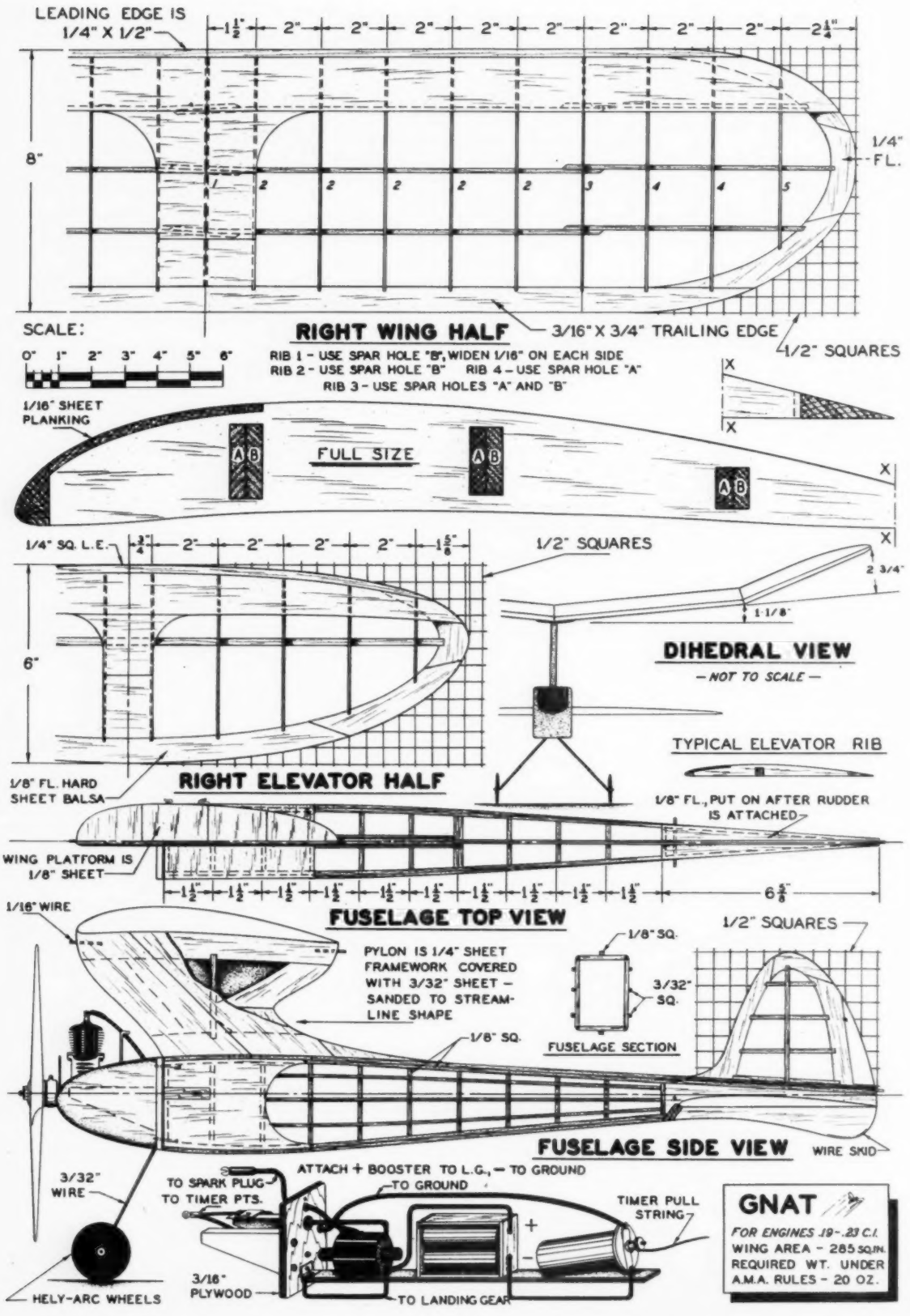
The high power output of the turbojet engine, however, made it promising for Navy fighters since the latter must get off the comparatively short deck quickly, must climb rapidly to meet enemy attackers and must be capable of flying as fast, if not faster, than the enemy fighter. The Navy put one and one together and came up with the composite-powered fighter: a reciprocating engine for cruising and a turbojet engine for speed and rapid climb when needed.

Experimental contracts were awarded to Ryan Aeronautical Corp., resulting in the famed FR *Fireball* fighter; and to the Curtiss-Wright Corp., resulting in the XF15C-1, our Plane on the Cover this month.

The two airplanes comprised two phases of development of a composite-powered fighter, the XF15C weighing about twice as much as the FR and possessing considerably more power. Both contracts were let during the height of the war and extensive plans for accelerated development leading to early quantity production were drawn up. The contracts were let early in 1944 with quantity production scheduled to begin early in 1945.

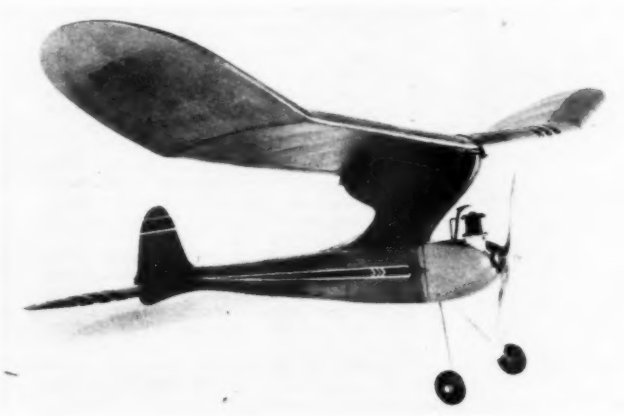
The XF15C was designed to utilize the most powerful reciprocating and the most powerful turbojet engines that could be found. At that time the Pratt & Whitney R-2800 *Double Wasp*, then developing well over 2000 hp, was the most

(*Turn to page* 51)


LEADING EDGE IS 1/4" X 1/2"
1½" 2" 2" 2" 2" 2" 2" 2" 2" 2¼"
8"
1/4" FL.
SCALE:
0" 1" 2" 3" 4" 5" 6"
RIGHT WING HALF
3/16" X 3/4" TRAILING EDGE
1/2" SQUARES
RIB 1 - USE SPAR HOLE "B", WIDEN 1/16" ON EACH SIDE
RIB 2 - USE SPAR HOLE "B" RIB 4 - USE SPAR HOLE "A"
RIB 3 - USE SPAR HOLES "A" AND "B"
1/16" SHEET PLANKING
A B
FULL SIZE
X
1/4" SQ. L.E.
¾" 2" 2" 2" 2" 1 5/8"
6"
1/2" SQUARES
2 3/4"
1 1/8"
DIHEDRAL VIEW
— NOT TO SCALE —
TYPICAL ELEVATOR RIB
1/8" FL. HARD SHEET BALSA
RIGHT ELEVATOR HALF
1/8" FL., PUT ON AFTER RUDDER IS ATTACHED
WING PLATFORM IS 1/8" SHEET
1½" 1½" 1½" 1½" 1½" 1½" 1½" 1½" 1½" 1½" 6⅜"
1/16" WIRE
FUSELAGE TOP VIEW
1/2" SQUARES
PYLON IS 1/4" SHEET FRAMEWORK COVERED WITH 3/32" SHEET — SANDED TO STREAM-LINE SHAPE
1/8" SQ.
3/32" SQ.
FUSELAGE SECTION
1/8" SQ.
FUSELAGE SIDE VIEW
WIRE SKID
3/32" WIRE
TO SPARK PLUG
TO TIMER PTS.
ATTACH + BOOSTER TO L.G., — TO GROUND
TO GROUND
TIMER PULL STRING
+
−
3/16" PLYWOOD
TO LANDING GEAR
HELY-ARC WHEELS
GNAT
FOR ENGINES .19-.23 C.I.
WING AREA - 285 SQ.IN.
REQUIRED WT. UNDER A.M.A. RULES - 20 OZ.

Gnat

by CLAUDE McCULLOUGH



THE *Gnat* is a high-performance gassie with a consistent contest record, yet so simple in construction that it is unhesitatingly recommended as an ideal subject for a modeler's first powered model. Class A ships have always been popular for their convenient size, and the short moment arm and low aspect ratio wings make this one just about the minimum size for its engine range.

Although flown in many extremes of weather, the ship undoubtedly received its acid test for ruggedness in the stiff (!!) Kansas breezes at the '46 Nationals, coming through with nary a scratch. Its first flight of 4 min. 17 sec. was one of the longest of the day, but a defective motor which insisted in revving down immediately on launching whittled down the total time to 6th place. Notable flights with *Gnats* last season include John Heasley's 15 min. o.o.s. (and never recovered) flight at the Omaha, Neb., contest, and a 16 minute o.o.s. flight by the author's ship at Burlington, Ia. This smallest ship our club contest team flew is credited with the biggest trophy—the giant David Lodwick Memorial taken by fellow *Hornet* Bill Hasting at the Centerville, Ia. Central States Meet.

The plans may be enlarged by use of the scale ruler on the plan or with dividers. Grid squares have been provided for the curved portions which require accurate reproduction, and this method can be used on the entire plan if so desired.

FUSELAGE—The fuselage is of box construction made by building two main frames on fuselage side view from 1/8" sq. *hard* balsa and attaching them with crosspieces of widths indicated on top view. Build up the pylon from 1/4" sheet pieces (indicated by dotted lines) and plank with 3/32" sheet balsa. Sand to streamline shape and notch the bottom to fit into fuselage cross-pieces. Cement to fuselage and plank on both sides and on fuselage bottom with 1/8" sheet balsa. The fuselage sides are planked with 3/32" sheet. Face the front of fuselage with 1/6" plywood and cement two small nails securely in center of the top and bottom of the facing to key the firewall in place. A 1/16" plywood insert with a 1/16" wire hook is cemented into the fuselage side for the firewall attachment rubberbands. Plank the inside of the fuselage with 1/16" balsa. The firewall is 1/4" spruce plywood, to which is bolted, by means of sheet aluminum brackets, the 3/32" spring steel landing gear. The motor mounts can be the standard aluminum variety, but it is suggested that you have a pair of steel mounts made from sheet metal at a tin shop. These mounts are a good deal more rugged than aluminum, and by using them your adjustment won't be altered every time the ship makes a hard landing.

The ignition is mounted on a 3/16" x 3/8" plywood track as detailed on the plan, and is bolted to the firewall on one of the landing gear bolts with a small aluminum bracket. The cowling is carved from a solid block, fitted to the type motor used, and silked inside and out for strength. The firewall attachment hooks should not be fastened to the cowling but to the motor mounts. Small hooks are used on the cowling so that several loops of the firewall attachment rubber bands may be used to secure the cowl in place. Side stringers are 3/32" sq. and those on top and bottom are 1/8" sq. The rudder is an integral part of the fuselage and does not remove with the elevator as is generally the case. This is also for retaining your adjustments, a primary requisite on a contest job. The rudder is of simple "flat" construction, built up from a 1/8" flat outline with 1/8" sq. ribs. An aluminum tab is used and should be cemented in place when the ship is adjusted to your satisfaction. Back part of the fuselage (1/8" flat sheet) is fitted to top curve of the elevator, which is attached with rubberbands on the 1/16" wire pins.

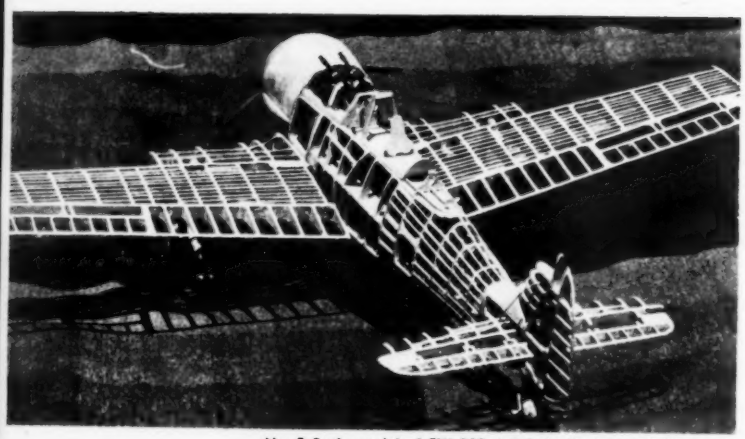
FLYING SURFACES—Cut out wing ribs from 1/16" sheet and slot for the spars. Rib No. 1 is indented 1/16" from the pattern on top and bottom to allow for planking as are two of Rib No. 2. The spars are cut from 1/8" hard sheet stock in widths and lengths indicated on plan. Assemble the wing over the plan in half sections by slipping ribs over the spars and cementing in place. Cement the trailing edge, leading edge and wingtip sections in that order in place and allow to dry thoroughly. Block

(*Turn to page 72*)

AIR WAYS

NEWS OF MODEL AIRPLANE EXPERIMENTERS FROM ALL OVER THE WORLD

No. 1 *Santa-Monica* by Otto Amrein built from parts of American bombers



No. 2 Scale model of FW 190 A-3 built by Joseph J. Souhrada

No. 3 J. C. Higgins' F-2B Fighter was built to fly counter-clockwise

No. 4 Carl Springer's stable *Skyfarer* has shock absorbing nose wheel

A NEW CROP of small racers are scheduled to appear at the National Air Races on Labor Day weekend in Cleveland. The small low powered ships, so popular before the war, will return in force to be flown in the Goodyear Trophy event which is limited to racing planes with no more than 85 hp; the ships are therefore small with many of beautiful design. Since fixed landing gear is a requirement, many of the entrants use the Cessna type of gear. (It is interesting to note that this style of landing gear was originated years ago by Steve Wittman for his "flying barn door" with which he successfully competed in past National Air Races.)

As this issue goes to press two ships have been announced, and it is known that others are being built; at least 20 entrants are expected for the Goodyear event. What a break these new designs will be for the scale model boys!

STOPWATCHES are a must for timing model flights of all kinds. Before the advent of control line speed work, the standard stopwatch used to time free flight models was of the style used for athletic events, namely one in which the large hand circled the dial once a minute. When the speed boys really got established, such a watch was not considered accurate enough and a style generally called the "hundredth second" watch came into wide use. On it the large hand circles the dial once a second. Such timepieces are rather expensive, however, and many individuals and even small clubs could not afford them especially since it is customary to compare times checked on two or three of these watches when timing speed flights.

With the release of war surplus material, a hitherto unused type of stopwatch has been made available to the public at reasonable prices. In this design the large hand circles the dial once every ten seconds, and each second is divided into ten

No. 5 Third helicopter by Don Chewinski rises 12'

No. 6 Ray Sullivan's beautifully executed A-26 *Invader*

good sized divisions so that hundredths of a second can be estimated quite accurately. A smaller hand and dial on the watch records up to 5 minutes (then repeats, of course) so that the watch is very useful for free flight work as well.

These surplus watches were intended for use by airplane navigators and are beautifully made by Elgin, Waltham and other famous watch makers. They are made with 9 to 15 jewels and, best of all, cost only about ten dollars. They offer a useful compromise between the old "slow" and "fast" watches and have been found entirely adequate for all model aviation purposes.

EASTERN TEAM SELECTED. The following Eastern delegation to the East-West Control Line Challenge Meet was chosen at eliminations held in the public model flying center at Flushing Meadows, L.I., N.Y.C., on July 26 and 27:

William Seidler, Brooklyn, N.Y.	Harold De Bolt, Williamsville, N.Y.
Ernest Babcock, Jr., Morris Plains, N.J.	Charles Lee, Riverdale, N.Y.
Louis Andrews, Newton, Mass.	Gene Pailet, Ozone Park, N.Y.
Edward Swenton, Syracuse, N.Y.	R. E. Tucker, Elizabeth, N.J.
Donald Kirk, Kenmore, N.Y.	Leon Schulman, Newark, N.J.
Blake Mueller, White Plains, N.Y.	A. De Sarles, Brooklyn, N.Y.
Robert McCarthy, Lockport, N.Y.	Stuart Richmond, Worcester, Mass.

Helpers and Alternate Flyers

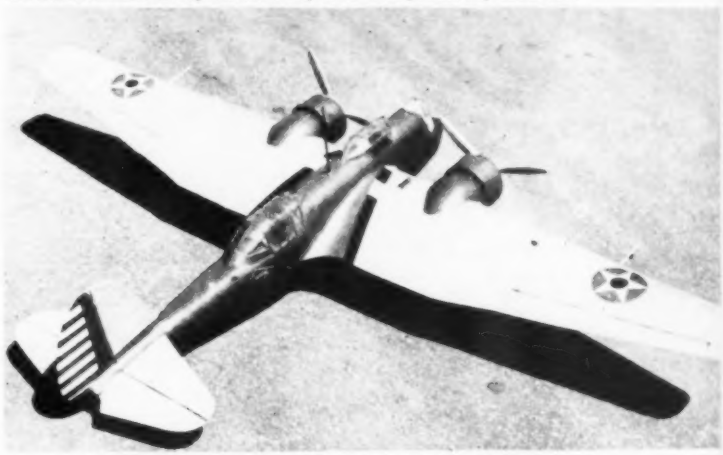
Ray O'Neill	Arthur Hasselbach
Normal Rosenstock	Scott Smith
Robert McKay	Matthew Kania
Edward De Gorge	Thomas Henning

(*Turn to page* 55)

No. 12 Aeronca *Champion* built by John C. Porter, Jr.

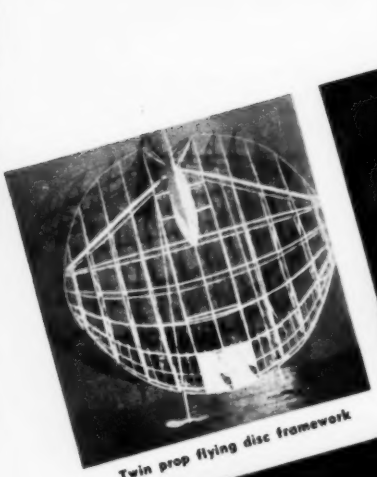
No. 7 Roger Kelly's *Southern Belle* glider built four years ago flies well

No. 8 *Blue Beetle* built by Bob Beardsley of balsa is powered by Arden .099

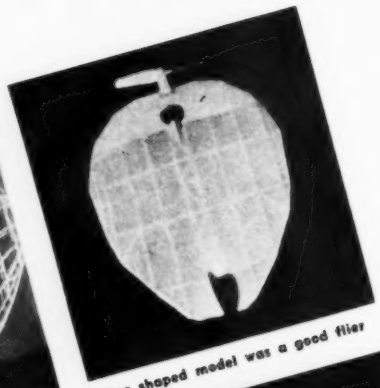


No. 9 Ralph Rahn's fine scale model B-10 has movable control surfaces

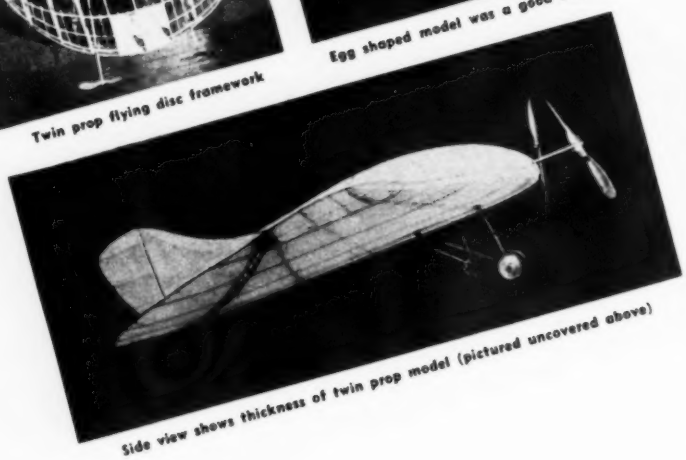
No. 10 (Right) Controliner by Francisco Uribe. (Left) No. 11 A. Bailey's stick pusher



Twin prop flying disc framework



Egg shaped model was a good flier



Side view shows thickness of twin prop model (pictured uncovered above)

UNIPLANE

Development of one of the original "Flying Saucers" was greatly facilitated by model tests

by RICHARD B. JOHNSON

OLD TIMERS in Chicago aeronautical circles who read of the Chance Vought-Navy *Flying Pancake*, the XF5U-1, in the January issue of this magazine may have gone back in memory to the early thirties and the local efforts to make a pancake fly. They perhaps reminisced to their model-making sons of Steven Nemeth's *Flying Umbrella*, of Dr. Snyder's and Raoul Hoffman's "half-a-pie" *Arup*, and of the writer's "Flying Turtle," the *Uniplane*. Nor should "Smiling Jack's" version of the *Arup* in the comic strips of that time be overlooked.

Steven Nemeth, who is now president of his own helicopter company, placed a thin, circular airfoil parasol fashion over a conventional airplane fuselage and tail assembly. Hangared at Curtiss Airport, the strange craft flew a number of times. The rather thin wing was about 15 ft. in diameter, had trailing edge flaps, and very little dihedral. The circular planform gave an aspect ratio of 1.27. (Aspect ratio is found on a planform other than rectangular by squaring the span and dividing by the area.)

Dr. Snyder of South Bend, Ind., and Raoul Hoffman, well known aeronautical engineer and writer, had considerable success with their *Arup* and demonstrated it at the Chicago Air Races. Several versions were constructed and plans made to go into production. A hangar fire destroyed their prototype and the project was ended. The *Arup* had an aspect ratio of 2.57.

The *Uniplane*, an ovoid all-wing with an aspect ratio of 1 or unity, was probably the first plan to fly with a wing chord longer than its span. The planform looked not unlike an egg with the narrow end trailing.

The "Flying Turtle," as Amelia Earhart nicknamed it after seeing a model fly in the Stevens Hotel lobby, evolved out of a much more intricate idea, a circular vertical-lift wing shaped like a doughnut. The hole of the doughnut was faced by the airfoil leading edge and a rotor in the hole was supposed to blow air over the wing. A 3 ft. model was made and displayed considerable lift when a vacuum cleaner rotor was held in the hole. However, power requirements appeared impractical and the idea was dropped in favor of the circular flying wing it suggested.

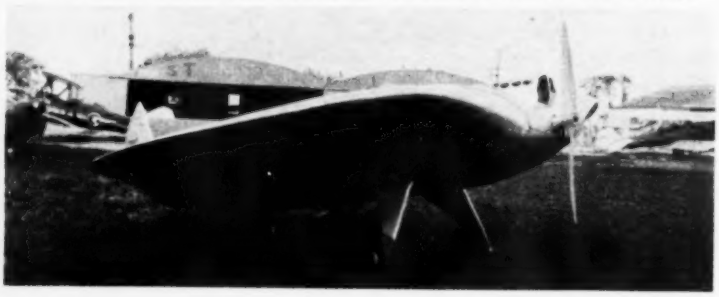
This model was also 3 ft. in diameter with the main structure in the form of a Clark Y airfoil—a true all-wing, without fuselage, without extended tail. Trailing edge elevons were built into the wing to compensate for center of pressure travel. Model controls were devised to operate the elevons off the stick to be certain that a differential system would work with cables. While the elevon control was satisfactory, the Clark Y airfoil caused instability without a tail, nor would the elevons give a stable adjustment.

There followed several exploratory models of flying wings, a diamond shaped wing, a high aspect ratio sweptback wing, and a mahogany windtunnel model that Hancock Foundation tested.

On completing the exploratory process, the writer turned back to the circular design, building a 15" model with a symmetrical airfoil. It was a relative success, displaying a slow landing speed with steep glide angle. However, longitudinal stability seemed somewhat uncertain. To determine the most

Author with his home-built *Uniplane*. It was a fine flier in spite of unreliable motor

Windows in wing allow downward vision. Small fin was later added in front of cockpit



stable planform, 3 x 5 cards were folded and cut to variations of a circular planform. Weighted with paper clips they were glided for comparison. The ovoid or egg-shaped planform showed a marked superiority over the pure circle and so an ovoid model having a 14" span and a 16" chord was built with an M-6 airfoil. Its performance and stability were so satisfactory as to warrant planning an experimental single place version.

It was in 1931, after the first circular model was built, that the writer applied for a patent on the basic principle of a circular or approximately circular flying wing. The evidence indicates that this patent application stimulated the NACA to do research on low aspect ratio, since all aeronautical patent applications must be referred to the NACA by the Patent Office for evaluation as is required by an Act of Congress. The wind tunnel results appeared in May 1932 in NACA Report #431, "Characteristics of Clark Y Airfoils of Small Aspect Ratio." C. H. Zimmerman, author of the Report, stated in his introduction: "A survey of the results of previous investigations . . . revealed a scarcity of data for aspect ratios of less than 3 . . . "

The results of the Report were most promising and the writer's patent was granted shortly afterward on November 8, 1932.

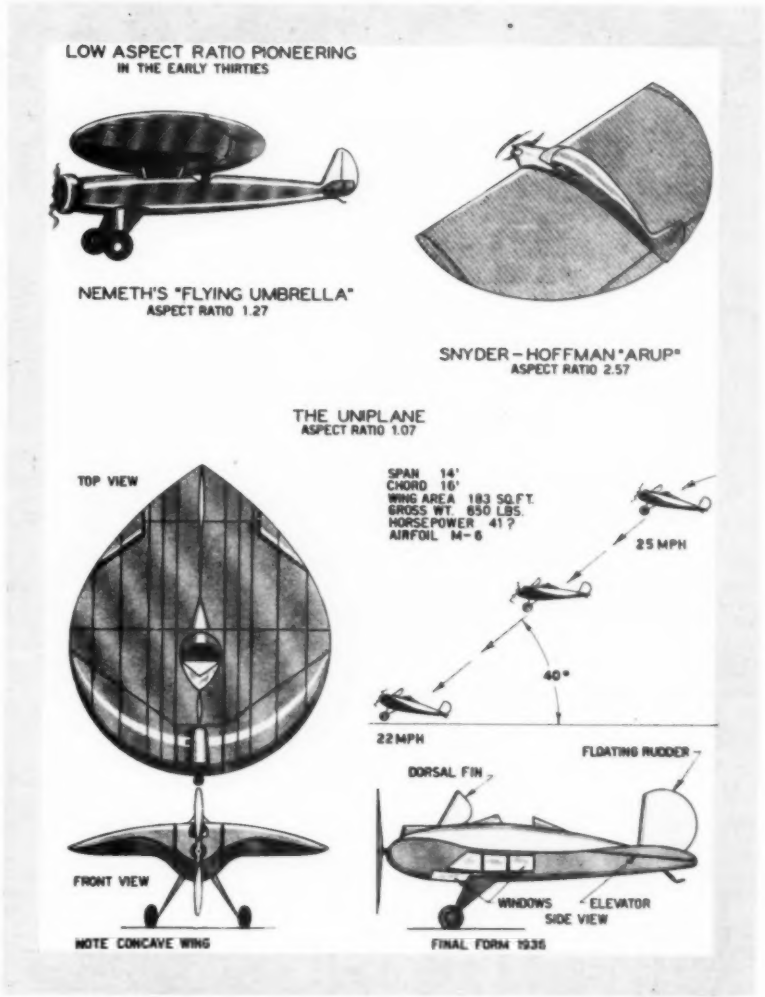
The NACA Report opened with the following introduction:

> "In recent years there has been an increasing demand for an airplane suited to the needs of the private owner . . . such an airplane should be capable of descending along a steep path at such a low rate of speed that it will be unnecessary for the pilot to alter the direction of the flight path or the speed near the ground in order to make a satisfactory landing. . . . It was immediately apparent that it was necessary to secure a high resultant force coefficient and a low lift/drag ratio at maximum resultant force coefficient. It was thought possible to derive benefit from the large induced drag of small aspect ratio wings at large values of lift coefficient."

In his conclusion, Zimmerman states:

> "1. There is a range of aspect ratios extending approximately from 0.75 to 1.50 wherein end flow causes a marked delay in the breakdown of the longitudinal flow as the angles of attack of an airfoil increases.
> 2. It is possible within this range to obtain maximum lift coefficients considerably higher than can be obtained for an airfoil of this same section having an aspect ratio of 6. The highest maximum lift coefficient obtained in this series of tests was 1.85 at 45 degrees angle of attack for the wing with circular planform as compared with 1.24 at 14 degrees angle of attack for the rectangular airfoil having an aspect ratio of 6:"

Several explanations of the low aspect ratio phenomenon have occurred to the writer which do not conflict with the idea that end flow stabilizes longitudinal flow. One is that as angle of attack is increased on a circular wing, the effective span is increased to approach the linear measure of the semi-circumference. Another explanation is that the wingtip vortices, which are proportionately large on low aspect ratio wings, in themselves create high drag and possibly considerable lift. This can be understood if one thinks of them as miniature horizontal tornadoes twirling at high velocity above and behind the wingtips. These vortices have a mass and inertia of their own that function much as would small wingtip parachutes in slowing down the wing and steepening the glide angle.



They are, of course, undesirable in climb and at cruising speed, holding the maximum lift/drag ratio to 9; but Zimmerman discovered in additional tunnel tests undertaken in 1935 that extreme wingtip dihedral eliminated much of this fault for climb and cruising at intermediate angles of attack. (See NACA Technical Note #539) Fortunately, aspect ratio is not a factor at high speed where the airfoil operates at minimum angles of attack. Thus low aspect ratio designs should have adequate power and be operated at high speed under all conditions except landing.

During the period of paper work on the experimental design, considerable time was spent trying to find financial backing, an adventure in human nature that continues to this day. At the urging of his father, the writer undertook constructing the ship in the basement and two-car garage with the spare time and pay a 9-hour elevator job permitted.

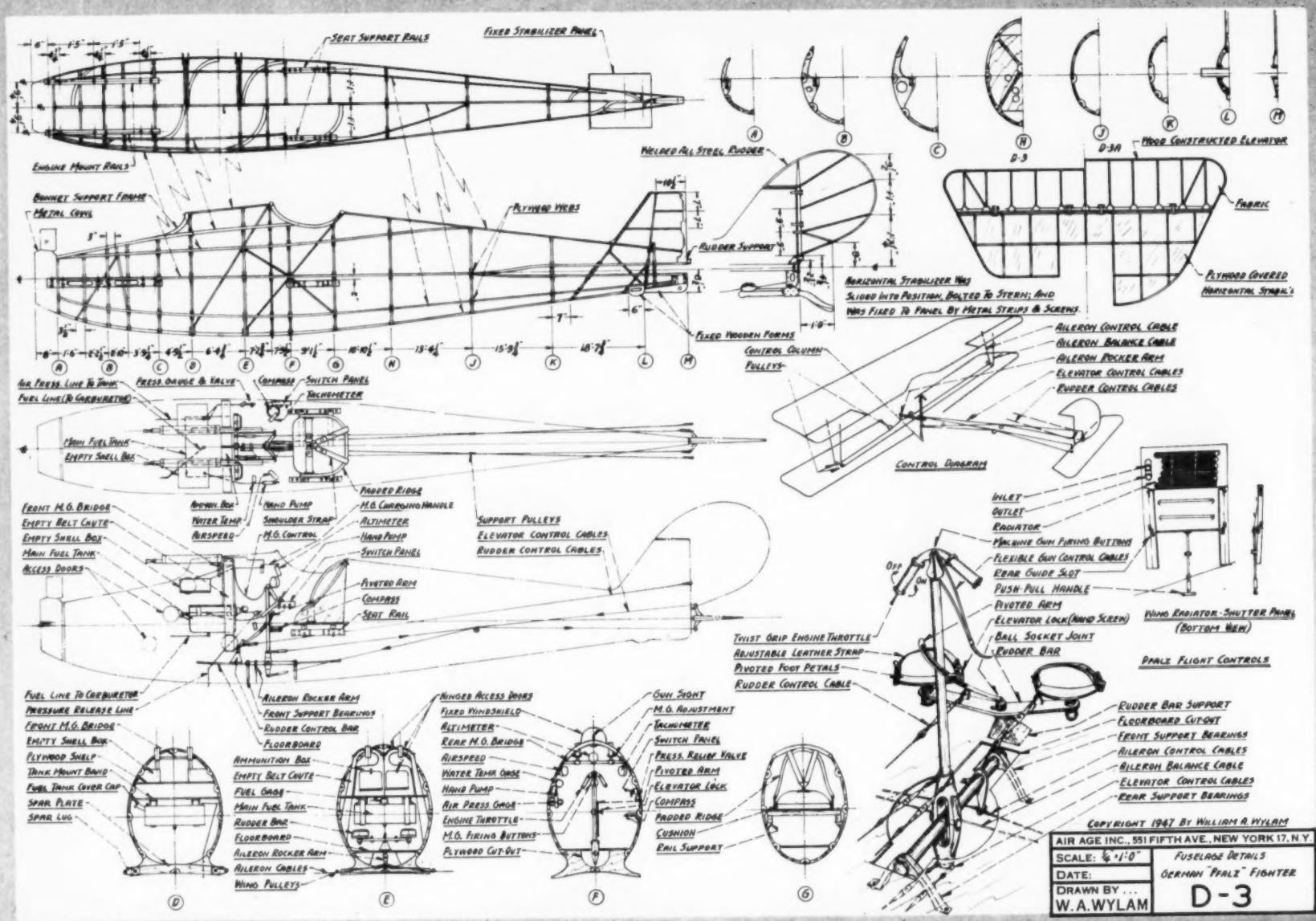
Essentially a flying model large enough to carry a person, the *Uniplane* was completed in 14 months. A 4 cylinder motorcycle conversion rated at 41 hp at 2800 rpm was installed, but in its two year career, it never delivered over 2600 rpm, which spelled the difference between success and failure.

Like the model, the *Uniplane* had a basic M-6 airfoil with thickness ratios adjusted to achieve the concave wing taper. A factory built Heath fuselage served as the main structural member but was completely enclosed inside the wing proper. The wing ribs and spars were of spruce and plywood construction in which a unique K truss was used for the larger ribs and spars to shorten the compression members. The landing gear was a discarded Monocoupe gear with shock absorber arms in the wing. The wing was of course fabric covered with windows in the bottom on each side of the cockpit and in front of the control stick. Yard long zippers closed the cowl giving convenient access to the engine. The entire control system was originally placed on the stick so that the ship could be handled entirely with one hand. The rubber grip was the throttle as on a motorcycle, and the ignition switch was a small toggle switch below the grip so that the little finger could flick it off in an emergency. While this latter arrangement was ideal for the switch, the throttle was found to interfere with delicate stick control and was made conventional for left hand operation.

The simplified two-control system on the stick was achieved by interaction of the rudder with self-dampening concave

(*Turn to page 50*)

WYLAM MASTERPLAN ● WYLAM MASTERPLAN ● WYLAM MASTERPLAN ● WYLAM MASTERPLAN



COPYRIGHT 1947 BY WILLIAM A. WYLAM

AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.	
SCALE: ½"=1'-0"	FUSELAGE DETAILS
DATE:	GERMAN "PFALZ" FIGHTER
DRAWN BY ... W.A.WYLAM	D-3

WORLD WAR I

by ROBERT C. HARE

This Camel was one of few to use Gnome Monosoupape 150 hp engine

Clerget powered Camel as used by 17th and 148th U.S. squadrons

Hump in cowling between struts is clearly evident in this Le Rhone engined Camel

BY the spring of 1916 war in the air began to take on the aspects of a first class free-for-all. The old planes used during the winter of 1915-16, actually little improved over pre-war designs, had about outlived their usefulness structurally and performancewise. Into the mad scramble for aerial supremacy the belligerents threw an almost endless series of new designs evolved and put in service with amazing rapidity.

The synchronized machine guns perfected first by Anthony Fokker were mainly responsible for this rush of new types. As synchronization was perfected by the Allies, it was readily apparent to authorities that existing planes just weren't up to the possibilities provided by a fixed forward-firing gun. And as tactics changed and air warfare got rougher, the cry for more power, more speed and more maneuverability was loudly heard on both sides of the Front.

Camel Background

England's answer was largely provided by the Sopwith Aviation Company, Ltd. which produced in rapid succession the famous *Pup* in February 1916, and the three-winged *Tripehound* in May 1916. Planes such as these were actually interim fighters. But through them something of a formula for pursuit planes was evolved and all that remained was refinement of ingredients to put a first class fighter in the air.

That first class fighter was the *Camel*, on Sopwith's drawing boards early in 1916. Although it was unmistakably Sopwith in design, it exhibited details that showed it to be a refinement of formula. One of the details was a twin synchronized machine gun installation, the first designed into any single seater. A pronounced hump on the forward top side of the fuselage covered the twin Vickers' breeches and gave the plane its name. The new fighter was officially identified, however, as the Sopwith F.1.

Autumn of 1917 saw the first two *Camel* prototypes enter flight and engineering tests. One example was assigned to static tests while the other went to the flight test section. These two activities were carried out simultaneously. As soon as static tests showed the plane capable of withstanding design loads, flight testing became tougher and tougher. Finally, on December 22, 1916 the F.1 *Camel* was pronounced O.K. by both divisions and production was begun.

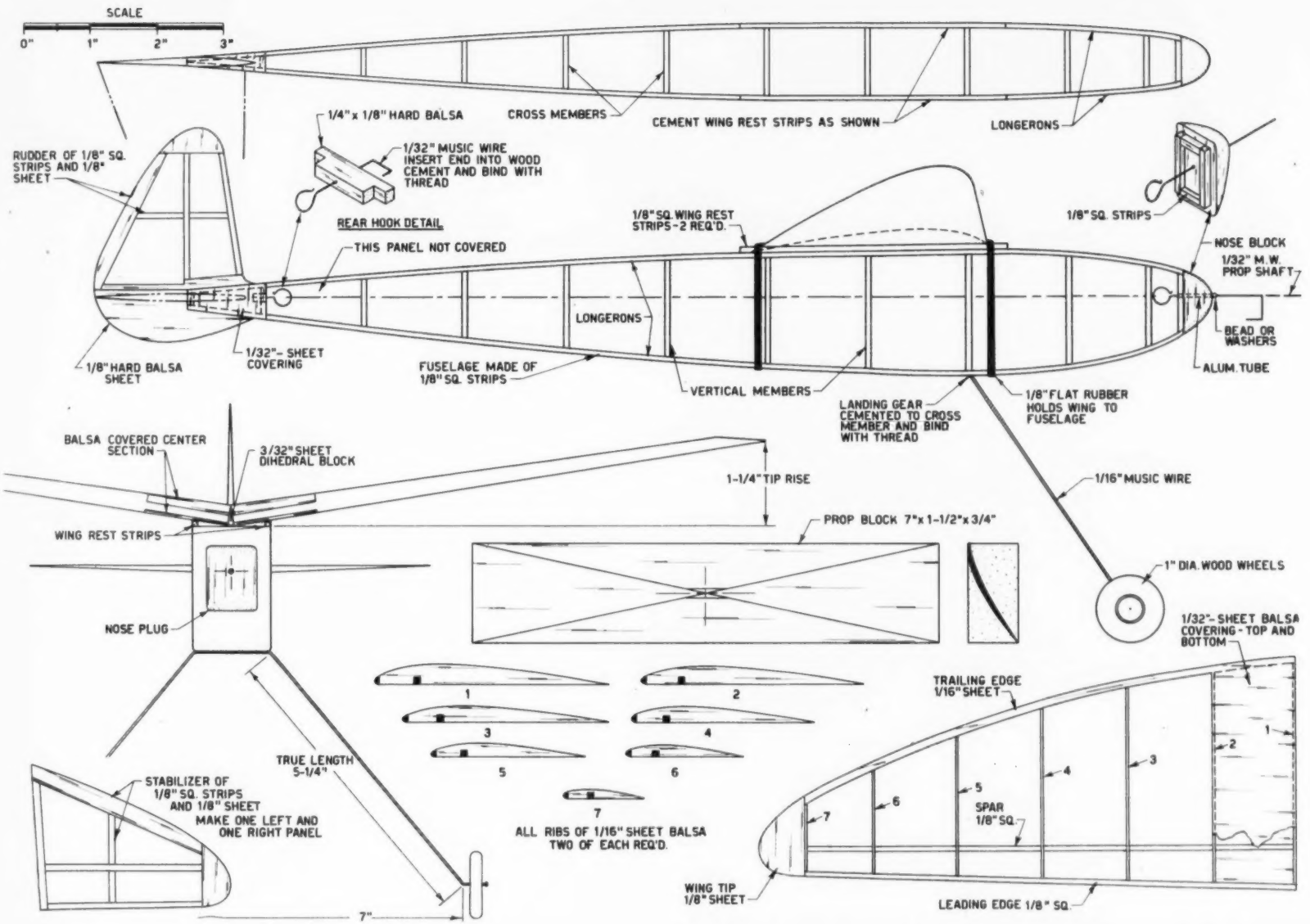
"Fly A Hump"

The *Camel* was so great an improvement over previous single seaters adapted as fighters that the British Air Ministry immediately awarded contracts to literally scores of manufacturers to produce parts for a veritable fleet of the new ships. At least three major builders in addition to the greater part of Sopwith's vast production facilities dropped everything else to make *Camels*. And nearly a dozen lesser aircraft builders cleared their shops to produce the foisty little F.1. The effort was so great that *Camel* production up to the Armistice in November 1918 totaled 5490 units—more than any other British gun carrying airplane.

The Air Ministry lost no time replacing the DH-2, F.E.8, Martinsyde, Bristol and Sopwith *Pup* scouts with the *Camel*. But even these efforts were not enough to satisfy the demands of pilots to transfer to *Camel* squadrons. It became stylish to fly a *Camel;* "Fly a Hump" was the patriotic gesture of the day!

Once at the Front and in advanced training schools, the *Camel* almost overnight became as unpopular as poison ivy. It seems a lot of pilots didn't follow their training rules and were killed on *Camels*. These few casualties were blamed on the *Camel* itself in spite of the excellent record it

(*Turn to page* 74)


SCALE
0" 1" 2" 3"
1/4" x 1/8" HARD BALSA
CROSS MEMBERS
CEMENT WING REST STRIPS AS SHOWN
LONGERONS
RUDDER OF 1/8" SQ. STRIPS AND 1/8" SHEET
1/32" MUSIC WIRE INSERT END INTO WOOD CEMENT AND BIND WITH THREAD
REAR HOOK DETAIL
THIS PANEL NOT COVERED
1/8" SQ. WING REST STRIPS - 2 REQ'D.
1/8" SQ. STRIPS
NOSE BLOCK
1/32" M.W. PROP SHAFT
BEAD OR WASHERS
ALUM. TUBE
LONGERONS
1/8" HARD BALSA SHEET
1/32" - SHEET COVERING
FUSELAGE MADE OF 1/8" SQ. STRIPS
VERTICAL MEMBERS
LANDING GEAR CEMENTED TO CROSS MEMBER AND BIND WITH THREAD
1/8" FLAT RUBBER HOLDS WING TO FUSELAGE
BALSA COVERED CENTER SECTION
3/32" SHEET DIHEDRAL BLOCK
1-1/4" TIP RISE
1/16" MUSIC WIRE
WING REST STRIPS
PROP BLOCK 7" x 1-1/2" x 3/4"
1" DIA. WOOD WHEELS
NOSE PLUG
1/32" - SHEET BALSA COVERING - TOP AND BOTTOM
TRAILING EDGE 1/16" SHEET
1
2
3
4
5
6
7
STABILIZER OF 1/8" SQ. STRIPS AND 1/8" SHEET
MAKE ONE LEFT AND ONE RIGHT PANEL
TRUE LENGTH 5-1/4"
7"
ALL RIBS OF 1/16" SHEET BALSA TWO OF EACH REQ'D.
SPAR 1/8" SQ.
WING TIP 1/8" SHEET
LEADING EDGE 1/8" SQ.

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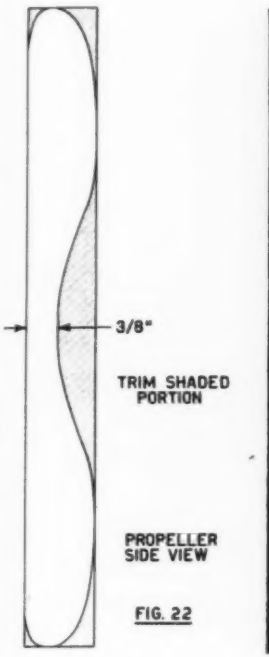
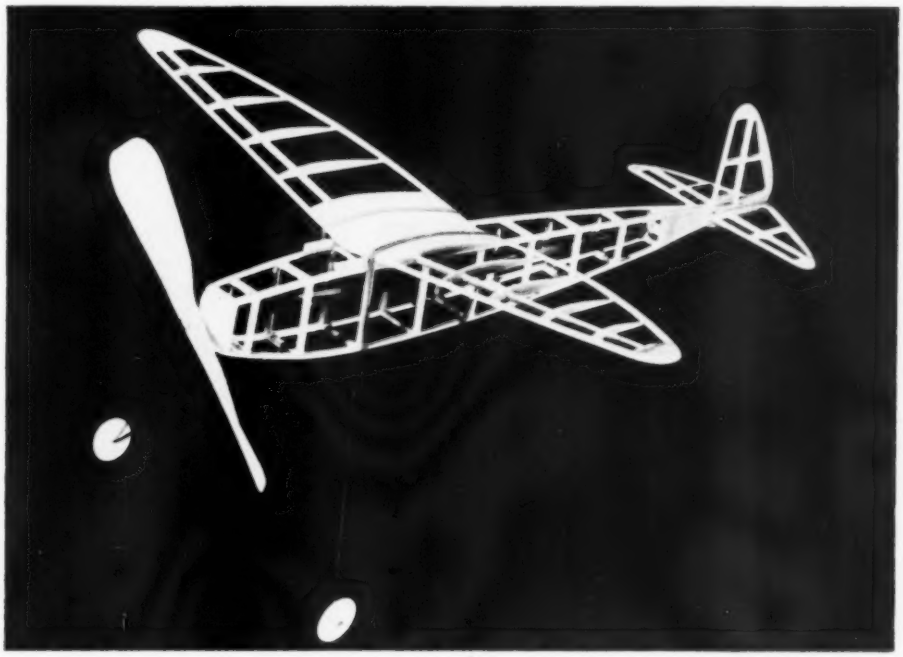


FIG. 22



LESSON 6—Build and Fly a Built-Up Outdoor Fuselage Model.

PICTURED in Fig. 21 is the completed framework or skeleton of a typical outdoor fuselage model. Building this ship and learning to adjust and fly it is the subject of this lesson.

Materials Required—1. Six 3 foot lengths of medium hard 1/8" square balsa strips.
2.. One sheet of 1/16" balsa.
3. One sheet of 1/8" balsa.
4. One sheet of 1/32" balsa.
5. Soft balsa block 1" x 1/2" x 3/4" for nose block.
6. A medium hard block of balsa 7" x 1-1/2" x 3/4" for propeller.
7. A pair of wooden wheels 1" diameter.
8. One length of 1/16" music wire for landing gear.
9. 1/32" music wire for prop shaft and rear hook.
10. A piece of aluminum tubing for thrust bearing 1/2" long x 1/16" O.D. (I.D. to be sufficient to take 1/32" wire without binding).
11. A small bead or 2 washers for prop shaft.
12. Two sheets of lightweight model airplane tissue for covering.
13. About 6 ft. of 1/8" flat brown rubber for power and wing fastening.
14. A large bottle of clear dope.
15. A tube of model airplane cement.
16. A spool of thread.

Tools Required—1. Wax paper; 2. small brush; 3. artists' spray tube; 4. sharp knife; 5. razor blade; 6. long nose pliers; 7. wire cutting pliers; 8. package of varied grade sandpaper; 9. ruler; 10. pencil; 11. scissors; 12. pins; 13. carbon paper. These are identical to tool requirements of previously constructed models.

Construction—Since half size plans are furnished it is necessary first to enlarge them by any of the processes described in Lesson 3. (Also, see pages 12 and 13 of this issue for various methods of enlarging plans.)

Working with full size plans will prove advantageous because a greater portion of the model is assembled over the drawings. Transfer of rib, wingtip, rudder, stabilizer, and other such contours is also simplified if traced directly from the drawings.

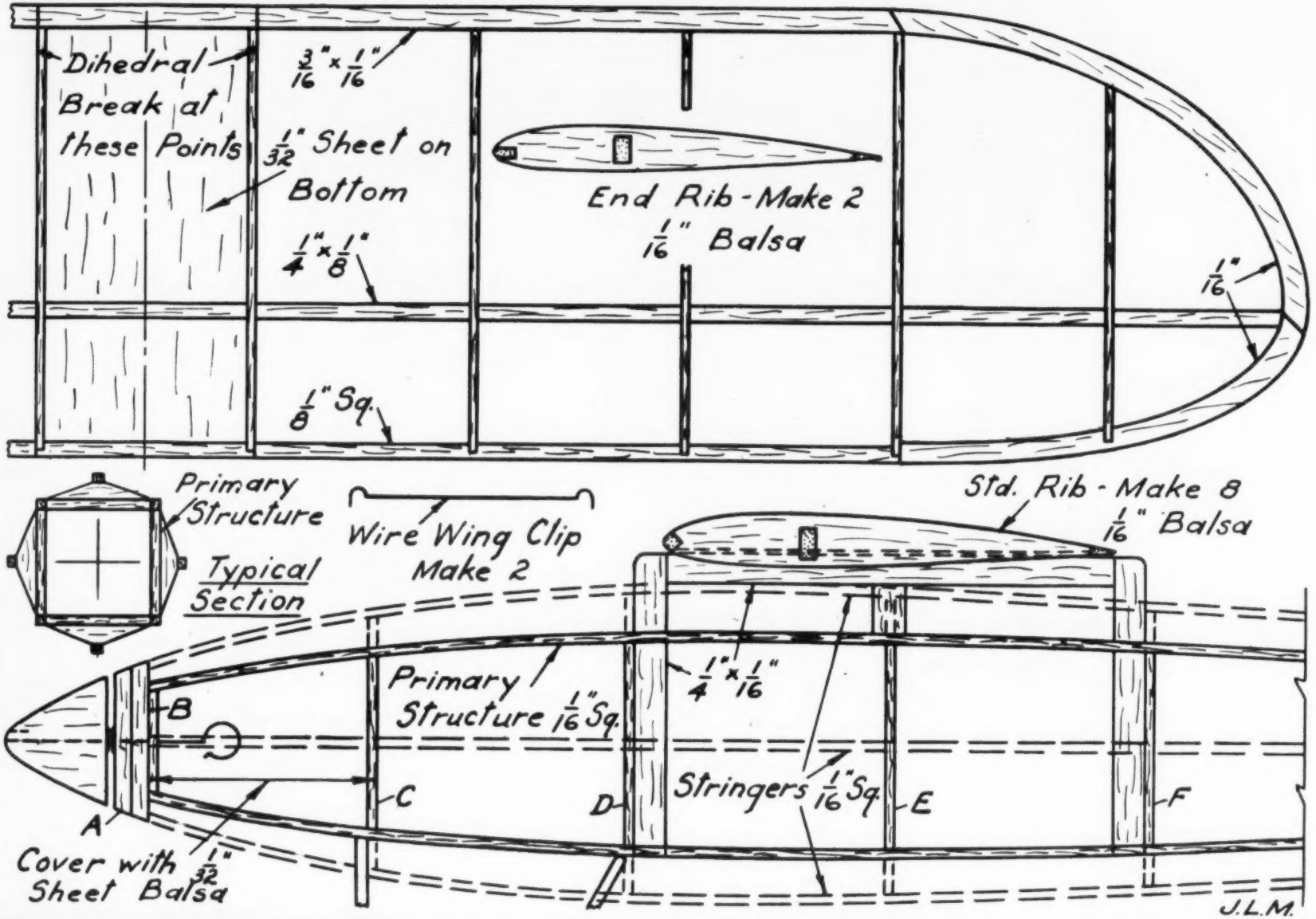
Fuselage—The fuselage of our model consists of a 1/8" sq. strip box-like frame. This is constructed of two side frames (as shown in side view) which include longerons and vertical members, the two being held together by crossmembers (as shown in top view).

To form the fuselage frame accurately, the balsa strips are placed into position on the plans. Before doing this, however, the plans should be tacked to a flat board and waxed paper placed over them. The strips are then placed over the waxed paper and held in shape by straight pins much like the procedure in Lesson 5. After the longerons have been 'jigged" to the board, cut the vertical members and insert into position. These, too, should be anchored with pins to prevent shifting. To insure identical dimensions for both sides, it is advisable to cut both sets of vertical members at the same time. Apply cement to the joints of the fuselage side and allow to harden before removing the pins. Assemble other side panel in identical manner.

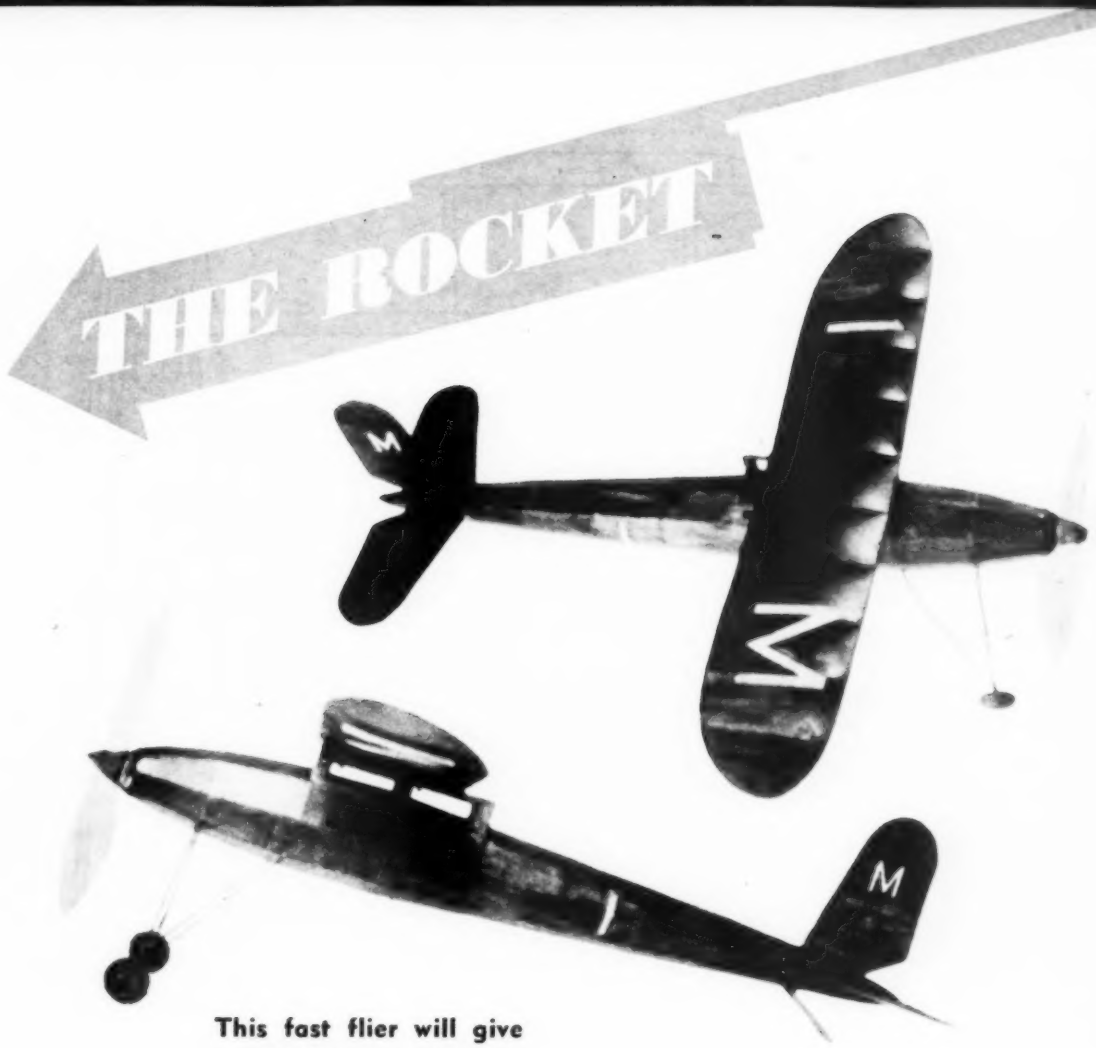
As indicated by top view in our plans, the fuselage sides are separated by crossmembers placed at right angles to the vertical member stations. Both upper and lower crossmembers of each station are the same in size. The three crossmembers located within the wing rest strips are also identical (in length). These (top and bottom) are first to be cemented to the fuselage side panels. After the glue on these has hardened, the aft ends of the panels are brought together and cemented. The balance of the crossmembers (top and bottom) are then inserted into place and glued. Cut the rear hook support of 1/8" sheet as shown in the detail. Form rear hook of 1/32" music wire and fasten to support. Insert the rear hook support assembly into position indicated and cement. When cement has hardened, cover the end panel—sides, top and bottom—with lightly sanded 1/32" sheet balsa. Form the landing gear as shown and cement and bind it to the lower crossmember indicated in plans.

The balance of the fuselage is now covered with tissue (excepting rear hook access panel shown). Method used for

(*Turn to page 66*)


Dihedral Break at these Points
3/16" x 1/16"
1/32" Sheet on Bottom
End Rib - Make 2 1/16" Balsa
1/4" x 1/8"
1/16"
1/8" Sq.
Primary Structure
Typical Section
Wire Wing Clip Make 2
Std. Rib - Make 8 1/16" Balsa
1/4" x 1/16"
Primary Structure 1/16" Sq.
B
C
D
Stringers 1/16" Sq.
E
F
A
Cover with 1/32" Sheet Balsa
J.L.M.

THE ROCKET



This fast flier will give you thrilling speed dashes with perfect stability

by J. L. MACKENZIE

HERE is a super-streamliner that offers the ultimate in all around flying ability and yet is simple enough for a beginner to construct. It is extremely stable in flight and is characterized by a terrific climb and high rate of speed on the straightaway. For sport flying it compares well with a gas model, which it resembles in the air.

The *Rocket* offers two unique design features which are responsible for its particular characteristics. The octagonal fuselage is as neat appearing and as well streamlined as a round one, yet is no more difficult to construct than the orthodox rectangular type. The M-12 double convex airfoil adds speed and stability to the model. This type of wing has a very low center of pressure travel which enables the ship to climb almost vertically with no tendency to loop.

Since the plans are presented here full size, they may be removed from the magazine and used directly as layouts. They are self-explanatory, so it will not be necessary to go into detailed instructions. A few pointers will suffice.

The side view of the fuselage also serves as a top view for assembling the structure. The two horizontal fins are identical with the vertical fin shown, so make three of these.

It will be noted that the landing gear is constructed of bamboo. Although this material is not as widely used as it once was, it makes an extremely strong yet light undercarriage. If your model shop cannot supply you, look for an old fishing pole. To the inexperienced we might say that bamboo must be split to size with the point of a knife. It cannot be cut easily. It is readily bent to a permanent shape over a candle or gas flame.

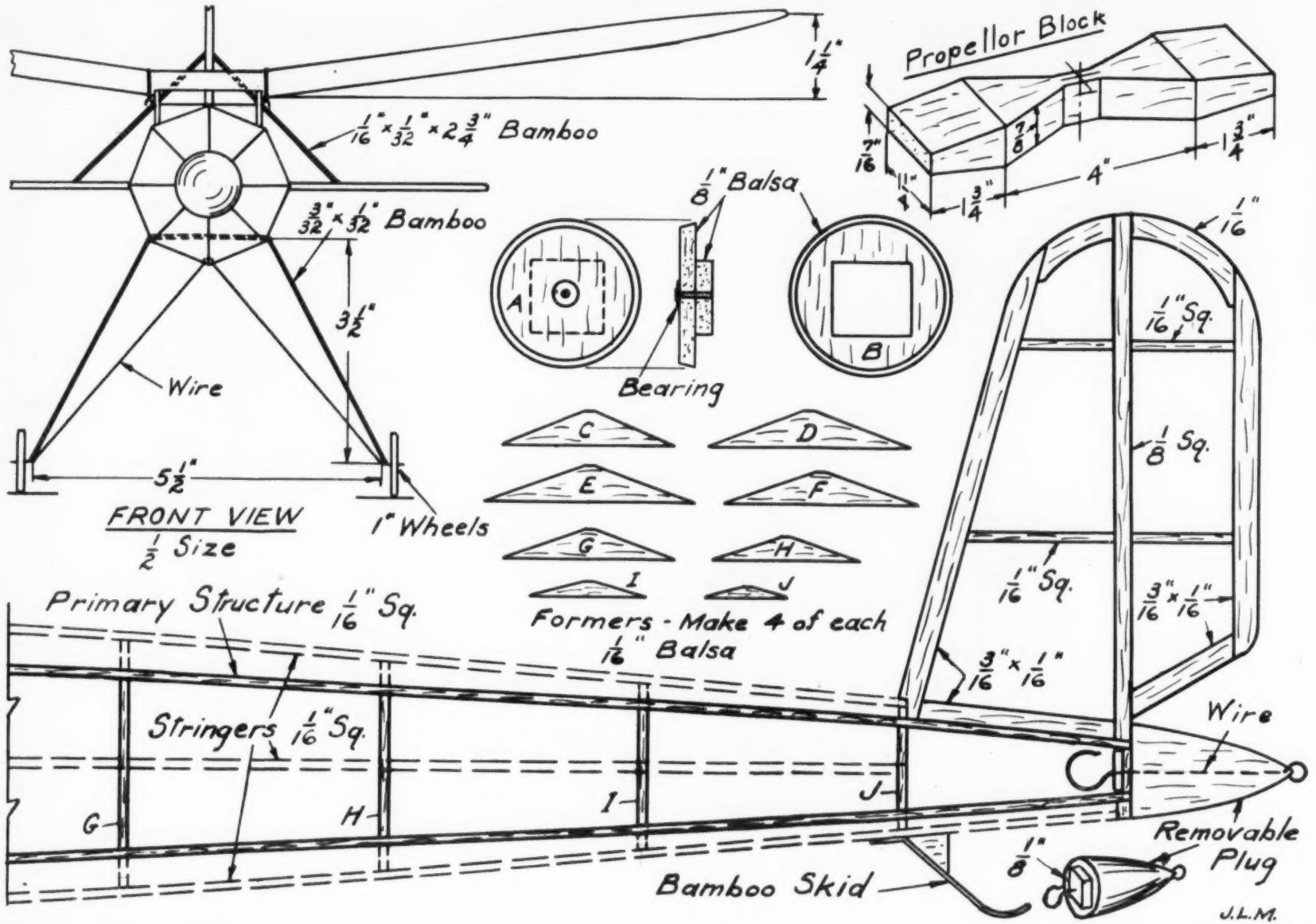
The center section of the wing is flat on the bottom so that it will rest squarely on the wing mount at zero incidence.

In covering the fuselage use 8 strips of tissue, cementing them only to the stringers and longerons. This will produce an extremely smooth appearance. Spray the model with water to shrink the tissue before using dope.

The removable balsa tail plug containing the rear motor hook allows the modeler to stretch the rubber out through the tail for use with a winder. The removable nose plug holds the propeller and front motor hook. It is advisable to use a long wire for threading the motor strands through the fuselage. 8 to 12 strands of 1/8" flat rubber will be used, depending on the type of flight desired.

The wing is held to the wing mount by running 2 rubberbands across the top surface and attaching them to the wire wing clips which pass under the mount. It may be moved backward or forward for flight adjustment.

Now about flying. The model should be glided for first adjustment. With the wing well forward for a flat glide, the *Rocket* will climb like its namesake when taking off into the wind. It will hold its nose into the wind, will not loop, and will not turn until maximum altitude is reached. With the wing set back for a steep glide, your model taking off downwind will hug the ground for a run of 50 to 60 ft. before zooming to a safe gliding altitude. The original *Rocket* was officially clocked at 42 mph in this type of flight.


1¼"
1/16" × 1/32" × 2¾" Bamboo
3/32" × 1/32" Bamboo
3½"
Wire
5½"
FRONT VIEW
½ Size
1" Wheels
Propellor Block
7/16"
7/8"
1¾"
4"
1/8" Balsa
A
B
Bearing
C
D
E
F
G
H
I
J
Formers - Make 4 of each
1/16" Balsa
1/16" Sq.
1/8 Sq.
3/16" × 1/16"
3/16" × 1/16"
Primary Structure 1/16" Sq.
Stringers 1/16" Sq.
Wire
Removable Plug
1/8"
Bamboo Skid
J.L.M.

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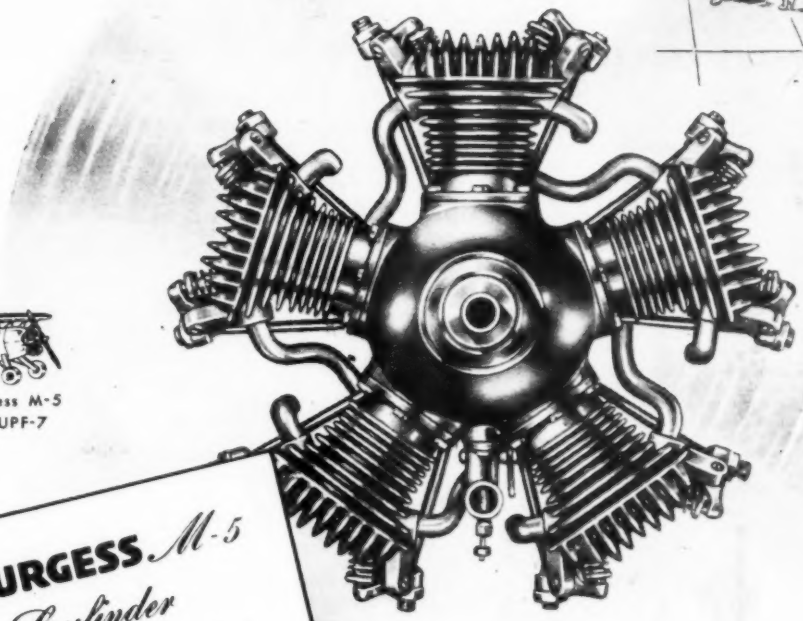

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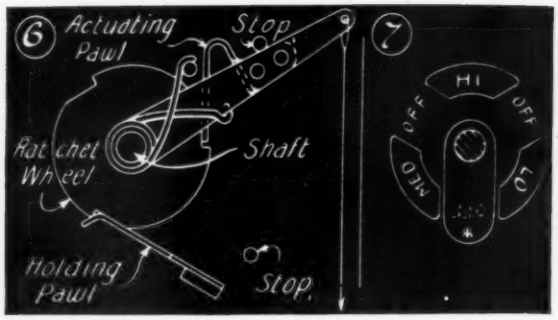
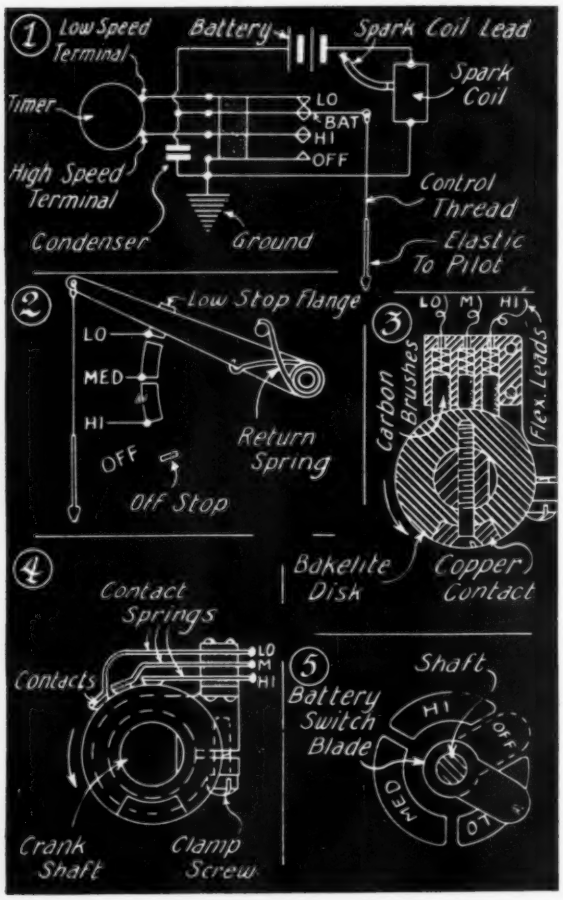
MULTIPLE SPEED TIMERS

by RAY RUSHER



RECENTLY two-speed timers for *Ohlsson & Rice* and *Herkimer O.K.* engines have been introduced which require a relay in the plane to switch from low speed to high speed, and also require a B battery of 22½ to 67½ volts carried in the pilot's pocket for supplying current for operation of the relay through insulated control wires. The old control thread idea that was originally used on Jim Walker's *Fireball* to change the timer arm setting, while not having the advantage of push button control operated by the same hand that holds the control handle, can be adapted to operate the two-speed timer and eliminate the B battery and the relay which adds weight to the plane. Neither does it require insulated control wires and the necessity of pigtail connections from them to the relay in the plane and to the B battery.

One simple arrangement is shown in drawing 1, which utilizes two single contact leaf springs labeled *LO* and *OFF* and two double contact leaf springs labeled *BAT* and *HI*. These are connected with the timer terminals, battery, spark coil, ground and condenser in the manner illustrated Such accessories as ignition switch, flight timer and booster plug have been omitted. Note that the circuit is so arranged that only one condenser is needed, yet the high and low timers are energized alternately instead of both being energized during slow speed operation. This effects greater battery economy as the energization of both timers lengthens the timer-on period about 50% above energization of one timer only. The *BAT* leaf spring has the control thread connected with it and extended from the plane at its center of gravity to the pilot. A one or two foot length of elastic or rubber is included as part of the control thread and is located at the pilot's end.



The *BAT* leaf spring is sufficiently stiff to require about a 3 oz. pull on the elastic to engage the *BAT* contact with the *HI* contact. Adjust the leaf spring by bending to secure this result. When it is desirable to stop the engine, pull harder on the elastic and the *HI* contact will engage the *OFF* contact thereby shorting the timer out of the circuit so that the spark coil is energized continuously to cause spark failure and consequent stoppage of the engine. As soon as the engine does stop, the tension on the control thread can be released and the *BAT* leaf spring returns to low speed position which breaks the battery circuit as the engine usually stops on the compression stroke with the timer points open. The elastic will be found to aid greatly in holding the *BAT* leaf spring in high or Off positions as considerable movement at the pilot's end of the control thread is necessary to change from low to High or Off.

Overlapping Contacts vs. Non-Overlapping Contacts

The description in the last two paragraphs assumes an arrangement of contacts in which there is overlapping contact action to prevent an open circuit when shifting from Low to High or vice versa. If the control action is non-overlapping, that is, if *BAT* disengages *LO* before it engages *HI*, the *OFF* contact can be eliminated and the engine can be stopped by a slow steady pull on the control thread. A quick pull on the other hand will result in minimizing the time between low and high speeds so that the engine may miss once or twice but will not stop while shifting.

Drawing 2 shows a somewhat simpler arrangement with a spring returned swinging switch blade and sliding contacts. This type is adapted for a third or even a fourth speed if you can make a timer having three or four sets of contacts which break the ignition circuit in different positions of the crankshaft, all within an angle of about 30° to 45°. Drawings 3 and 4 show two possible brush type timers which are comparatively simple but have some disadvantages as well as advantages compared with the usual circuit breaker type. Some of you modelers, however, are undoubtedly ingenious enough to work up a good one after studying these suggestions.

The control arrangements of drawings 1 and 2 have the advantage of the engine returning to low speed if the control thread happens to break. They do, however, depend upon holding the control thread at approximate predetermined tensions for the various speed and off adjustments. An arrangement can be provided which permits one pull on the control thread to shift from low to medium speed, after which the thread can be slackened and the switch stays at the medium speed position. Another pull then shifts to high speed after which the thread can again be slackened.

Drawing 5 shows a switch operable in the manner just described, and 6 shows a ratchet and pawl actuator for progressively shifting the switch. This is a three position switch. It can be made as a four position switch for *LO, MED, HI* and *OFF*, but then after *HI*, the *OFF* position would result in stopping the engine before the pilot could pull the control thread again if he wants to shift to *LO*. By making the switch three position and having *OFF* half way between *HI* and *LO*, a quick

(*Turn to page* 77)

FUEL TANKS

by RAY RUSHER

A REGULATION *Fireball* can be readily equipped with a fuel tank that will operate an engine of .23 cu. in. displacement at full speed for 25 to 35 min. The tank is not at all difficult to construct from scrap tin and copper tubes. Be sure the tin is perfectly flat, however, or you will have trouble in soldering the seams. The sides of a square 5 gal. can are most suitable and will make a tank weighing little more than the plastic tank usually furnished with engines and capable of running for only about 5 min.

If your engine is an *Ohlsson & Rice 23*, Fig. 1 can be used as a pattern. Drill the two small holes and cut the large one with a narrow sharp cold chisel. A ⅛" copper or brass tube A is then soldered to a washer or disc of tin C, and a tin tube B is soldered to the edges of the large hole and the disc C (see enlarged detail, Fig. 3). Tubes D and E are soldered in position; be sure, for neatness sake, that they are vertical to the tank top.

The top and bottom are then bent on the dotted lines at right angles to the front, and the lower end of tube A is soldered to the bottom at X to prevent excessive vibration from breaking the soldered joints shown by black shading in Fig. 3.

The sides and back are formed to fit the edges of the top and bottom ready for soldering the seams along these edges. First "tack" solder each of the seams at several equally spaced points; then solder all the way around them and the result will be a finished fuel tank of the appearance shown in Fig. 5. If care is used in soldering, the solder will flow into the seam and form a fillet as shown in Fig. 3 without prohibitive weight. Do some trial soldering on scrap pieces of tin first and you'll soon acquire the "Knack."

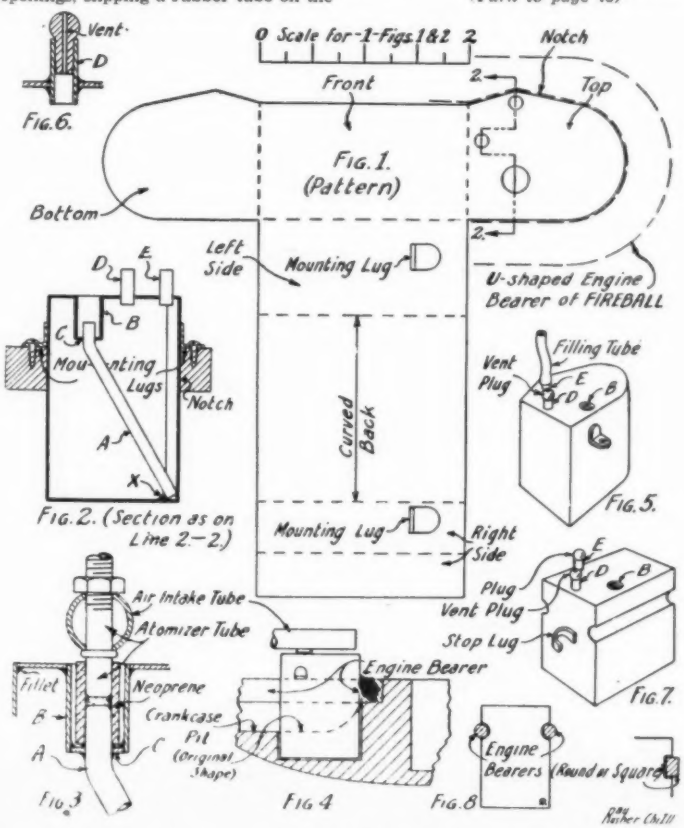
Test for leaks by plugging all but one of the openings, slipping a rubber tube on the copper tube at the opening and submerging the tank in water. By blowing into the rubber tube any leaks will be indicated by air bubbles. These leaks can be resoldered until the tank is completely leakproof and surplus solder scraped and filed off. As a final test, suck on the rubber tube and hold the vacuum with your tongue for 1½ or 2 min. Then, if there is still vacuum, observed by a sucking noise when removing your tongue from the rubber tube, you can be sure there are no leaks.

Carve a notch in the U-shaped engine bearer of the *Fireball* as in Fig. 1 to permit the bulge of the right side of the tank to fit in it, and gouge out the bottom of the crankcase pit to receive the lower end of the tank as in Fig. 4. Mount the tank on the engine bearers by means of two small screws through perforations of mounting lugs made of tin and soldered to the sides of the tank.

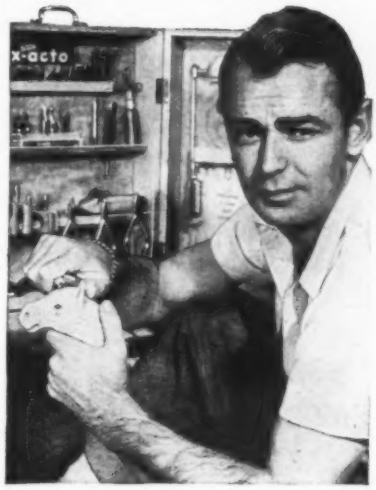
The atomizer tube is shortened by cutting off its lower end, and is connected to tube A by a short piece of neoprene tubing as in Fig. 3. This method of connection prevents engine vibration from being transmitted to the tank, and the air intake tube of the engine doesn't have to support the tank and its contents. The arrangement of the atomizer tube, countersunk into top of the tank, permits the tank to be located closely adjacent to the intake tube to minimize the distance that the fuel has to be raised by the engine suction and utilizes all available space for height of the tank.

The corner of the tank adjacent to the soldered connection X receives the last fuel in the tank due to centrifugal force throwing the fuel outward toward the right side of the tank on a plane that travels in a left hand circle. Terminating the tube A adjacent to this corner of the tank insures that substantially all the fuel will be used

(*Turn to page 73*)



Alan Ladd Starring in Paramount's "WILD HARVEST"



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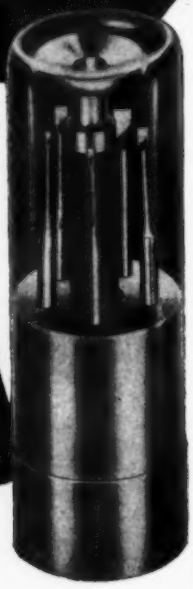

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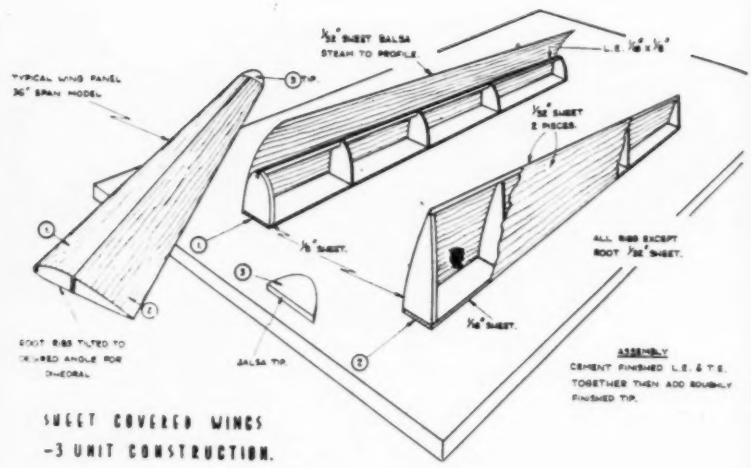


SHEET COVERED WINGS
-3 UNIT CONSTRUCTION.

SHEET COVERED WINGS

by W. A. Dean

MOST rubber and gas models are partially covered with sheet nowadays. If the internal structure weight is kept low, the *complete* wing can be balsa covered and still remain reasonably light.

In the system described and illustrated here, each panel is made up of three separate units: leading edge, trailing edge and tip. The main problem is to keep the light inner framework from twisting and warping while applying the outer skin, but with this method a true wing is assured.

First cut 1/16" sheet main spars and lightly cement them to the building board or table. Next cement the two end rib halves in place, followed by the L.E. in the case of the front portion. Then add the intermediate ribs and the two halves are ready for covering.

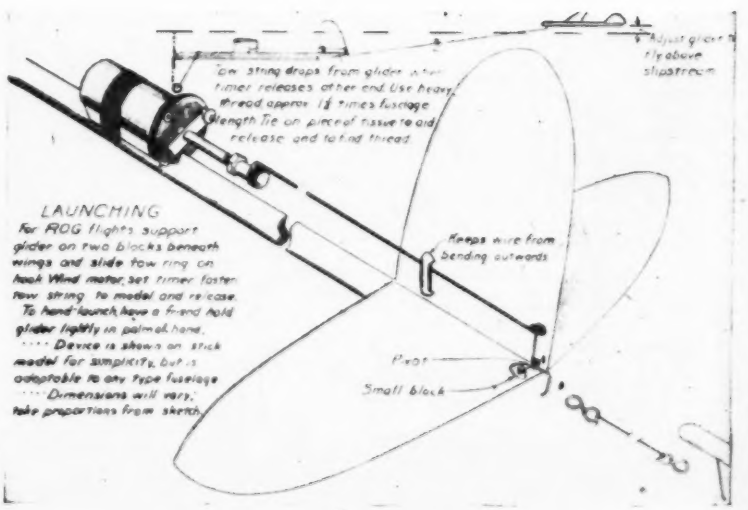
With the L.E., cement a piece of sheet to one edge of the main spar, wait until dry, then steam to the profile shape and cement over to the other spar edge. The T.E. is covered in two pieces in a similar manner.

The two pieces are then removed from the building board, by sliding a razor blade underneath them, and cemented together along the two spar faces and smoothed down to get rid of any lumps. The tip is roughly cut to shape from medium strength balsa, cemented in place and then sanded down to the right taper. The complete panel can either be treated to several coats of banana oil, or else covered with tissue and then doped.

This type of wing construction is very strong, being quite rigid in all directions. Holes are not very frequent, but when they do occur, it's an easy matter to fit a balsa patch in place.

AUTOMATIC GLIDER RELEASE

by M. J. Livingston


Adjust glider to fly above slipstream
Keeps wire from bending outwards
Prop
Small block
LAUNCHING
For HOG flights support glider on two blocks beneath wings and slide tow ring on hook. Wind motor, set timer, fasten tow string to model and release. To hand-launch, have a friend hold glider lightly in palm of hand.
Device is shown on stick model for simplicity, but is adaptable to any type fuselage
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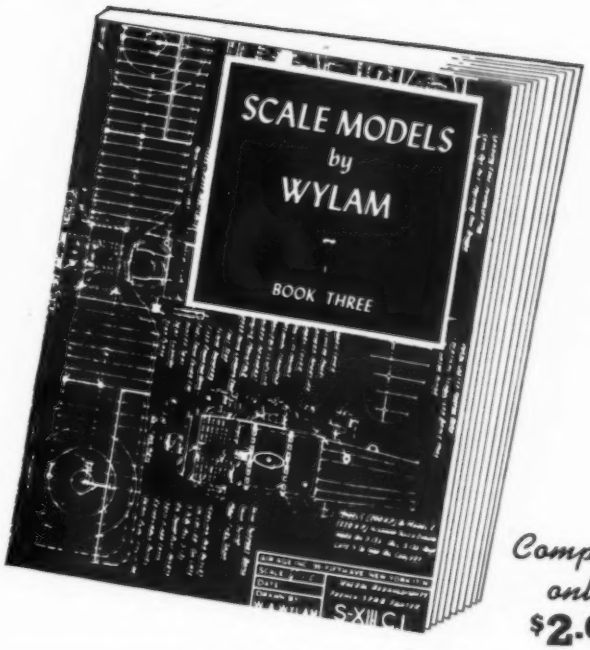

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Model Airplane NEWSLETTER

by AL LEWIS

AT long last the oldtimers in the model sport came into their own when, on Aug. 15, the Aero Club of Michigan held an "oldtimers" banquet in Detroit for those who had built models prior to 1935 and who were 25 years old or more.

To our knowledge this is one of the first sessions of its type ever called and should do much to bring back a lot of well known faces, as well as unite a lot of old friends. Some time ago we spoke of organizing an "Early Birds" group of original gasoleers, but the response wasn't deafening. Maybe the Detroit affair will provide the spark—who knows!

Toastmaster for the dinner was Bill Stout, granddaddy of model builders and famous designer of the old Ford tri-motor transport, the Scarab rear-engine motor car, and a number of lesser known but widely used articles.

HANDSOME JIM WALKER, inventor of U-control models, is in the news again. This time the International News Service carried a story on its coast-to-coast wires about Jim's latest development: sonic control. Under the heading, "Flies Model Plane Via Sonic Control," the item read:

> "Portland, Ore.—Jimmy Walker, skipping o'er the lea tooting a horn at a flying toy airplane, is not crazy. He has developed the most workable sonic control of a model airplane yet devised. His model is guided by remote control by only one tone, and that is emitted by the horn. Walker explains that when a sound wave hits a delicate diaphragm in the plane it activates a switch which pulls a rudder string. Walker believes the principle can be applied to real airplanes."

Jim told us that he firmly believes sonic control will one day be possible for the most inexperienced. It has many more possibilities than radio control since there are no government restrictions. The cost may even be less than radio control work.

Of course, the path of sonic-controlled flight will probably be a lot shorter than that of RC ships, since currently used radio bands carry to the horizon, or to large obstacles at least.

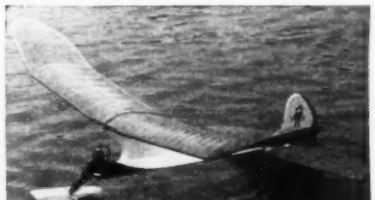
SPEAKING OF CHASING MODELS, or keeping them in sight, the latest wrinkle is radar! Yep, that's what we said—radar! At the National Capitol Model Air Show held at Hybla Valley, Va. airport on July 20, the District of Columbia National Guard was out spotting far-flying model planes with radar equipment. Brother, that's what we call real cooperation from a service organization. Whether the radar was fast enough to spot the high climbing models wasn't reported, but it wouldn't surprise any flyer a bit to learn that radar equipment which might track a P-80 wasn't good enough to keep a poorly-adjusted gas job in sight—you know, the kind that stalls and dives, stalls and dives.

This Washington, D.C. meet was quite a blue-ribbon affair, by the way. A.M.A. leader member Ralph Hopkins says that at one time he counted three Congressmen punching the stop watches on speed ships.

Four all-expense paid trips to the Plymouth meet in Detroit were awarded by motor car dealers located in the vicinity of Washington. Give that car company a year or two and they're going to make the Soap-Box derby look like a two-bit affair.

By the way, one of the sponsoring organizations for that Washington meet was the *Evening Star* newspaper. So big an affair did it turn out to be that its keen rival, the *Post*, covered the meet and gave the contest quite a spread—3 photos and a good story on the first page of its local section. Among the distinguished guests were: Brig. Gen. F. H. Smith, commanding the Civil Air Patrol; Representatives Hinshaw and Engle of California, and Latham of New York; and Mrs. Alys McKey Bryant, who made the first flight by a woman in Canada 35 years ago.

You've heard us speak several times in this column of Carl Hopkins of W. Va., who directed this National Capitol meet. Mr. Hopkins is to our mind one of the outstanding individuals in model aviation. He has been appointed national director of model aviation for Veterans of Foreign Wars, which means that that organization, both nationally and through its thousands of local posts, should soon be supporting aeromodeling clubs and contests on a wide basis.



Frank Parmenter's contest job illustrates proper attitude of ship in water, and simplicity of float adaptation to standard ships

The V.F.W. has been sponsoring a coast-to-coast series of radio programs, "Our Land Be Bright," on a 400 station network. Not long ago one of these programs was devoted to model aviation and to the work done for the modeler under sponsorship of Mr. Hopkins and his Clarksburg, W.Va., V.F.W. post. A good indication that your local V.F.W. post may be a prospect to sponsor your next meet! If you're trying to interest such a post in backing model building, ask the commander to get a copy of the program mentioned so that post members can listen to a recording. That should really "sell" them on the idea!

JOHN WORTH, publicity manager of the famed *Brainbusters Model Club* of Hampton, Va., reports on progress made with the first postwar technical conference which will be run off in October along with a big Hydroplane meet. According to Mr. Worth the tentative schedule is as follows:

October 4—visitors to the conference welcomed to Old Point Comfort, Va., comple-

(*Turn to page* 39)

Members of Brainbusters Club, Hampton, Va.—host to the first postwar national technical model aviation conference to be held Oct. 5

Closeup of float installation taken during contest activity. These floats (also ship) are still in service after four years flying

tion of hotel arrangements, then a tour of the National Advisory Committee for Aeronautics (NACA), the government's air testing labs at Langley Field.

October 5—Technical conference at Chamberlain Hotel with dinner, speakers, discussions, demonstrations, etc. The hotel rates at that time of the year will be nominal.

October 6—Hydro (rise-off-water) "Nationals" and Eastern Free Flight championships, followed by a Victory Dinner right on the field. For those who work up a sweat during the contest, shower facilities will be available.

Oldtimer Dick Everett has been appointed contest director and will be assisted by the *Brainbusters* to assure a meet run strictly from the model builder's standpoint. Other assistance by public groups will be of a nature that will not interfere with the meet itself.

The following Langley Field Army facilities will be available as per tentative agreement by Commanding Officer: barracks and bedding, traffic and spectator control, water and toilet facilities, radio-jeep model retrievers, public address system. The NACA Supervisor's Club is already committed to $300 worth of trophies and more are on the way.

The *Brainbusters* Club is preparing a booklet on Hydro Flying which will serve as guide for those who want to get in on this fascinating form of model flying but have had little experience in float work. The "hydro" part of the meet will include rubber as well as gas engine powered float planes. Large tanks will be set up on Langley Field so models can take off "dry land" so to speak.

Anent the renewed interest in rubber flying, Mr. Worth writes: "We note that this is definitely a free flight year with rubber making a solid comeback at long last. With four meets already by the boards, our (*Brainbusters*) immediate schedule calls for competition in three more in July alone! We'll be flying gas, rubber, towline and hand-launched gliders at Portsmouth and Suffolk, Va. and Washington, D.C. In addition, we'll have entrants at the Nationals, possibly Detroit, and one or two other distant meets. Occasionally a *Brainbuster* is found in a "yo-yo" meet (Controline), but generally the practice is not stooped to."

If at all possible, we suggest that you take in the doings at Langley Field. The technical conference should produce a lot of very interesting reports; the last one before the war got everyone conscious of the pylon for free flight models; maybe someone will come up with a new idea that will outpylon the pylons. For further dope, drop a line to *Brainbusters Model Club*, 21 S. King Street, Hampton, Va.

WE MUST TELL YOU about a telegram that came to our house the other day. It read: IF YOU ARE INTERESTED IN BEING SPON-

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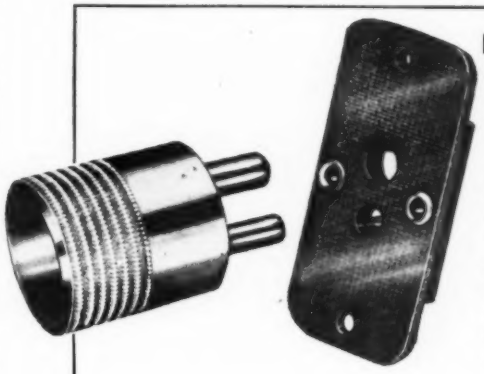

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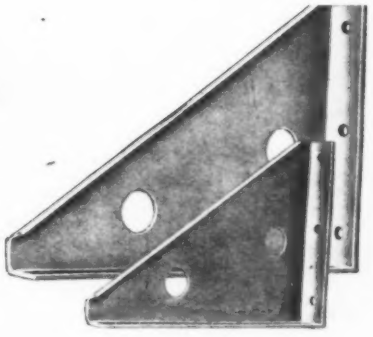

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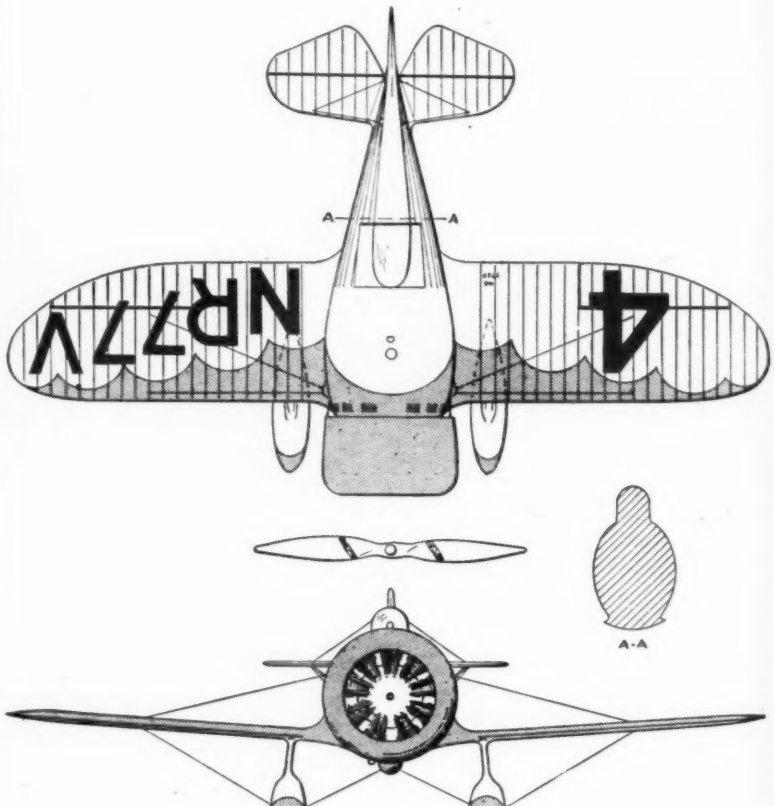
Gentlemen, we say that that's sponsorship of the type that every model builder needs more of—if you'll pardon us ending our sentences with a preposition!

All over the country Plymouth, De Soto and Chrysler dealers have sent modelers to compete in Plymouth's first international meet in Detroit. If you weren't one of those invited to participate, and maybe have an offer of a free trip by a nearby auto dealer, it means you didn't write to Detroit asking for full details on the meet. So let that be a lesson to you!

In some localities the auto dealers ran an elimination contest and picked the winners for the trip. In others, they investigated to find who were the outstanding model aeronauts and chose them personally for the finals.

That an automobile dealer may be new to modeling but still plenty bright is borne out by the two chaps Mr. Fromkin picked. He was the person who sent the telegram, you will recall. Well, Mr. F. ended up with his two flying representatives in Detroit being Merrick S. "Pete" Andrews, holder of the national indoor duration record, and Warren Fletcher, holder of more official A.M.A. junior records than any other individual.

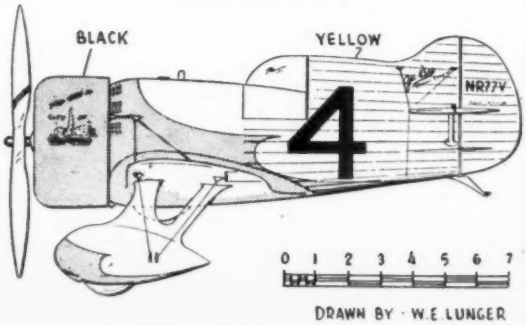
With dealers like that, Plymouth is a cinch to stick in the model aviation promotion field!



GEE BEE 1931

PILOT - LOWELL BAYLES

BLACK LETTERING ON FUSELAGE & WINGS
WHITE LETTERING ON COWL



DRAWN BY - W.E. LUNGER

LATEST FROM THE

ACADEMY OF MODEL AERONAUTICS

By Exec. Dir. Russ W. Nichols

Re: The Records

IT WAS logical to assume that with contest activity all over the country reaching a new high, a number of AMA national records would be broken. However, the Contest Board was quite unprepared for the terrific onslaught waged against national marks thus far this year. Every week brings with it a large batch of record performance report forms from all areas. No one type or category has been singled out it seems, and it is our belief that the present record smashing spree is due for the most part to advances made in the science of design and in the art of adjustment.

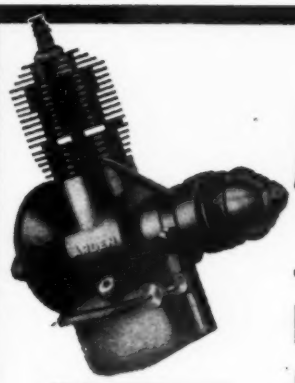
In addition to the two guesses given above, the stranglehold obtained by the *Oakland* (Calif.) *Cloud Dusters* on the indoor glider records may be credited to the fact that they have moved their scene of operations to an establishment known as the Cow Palace in San Francisco, which has a 104 ft. ceiling. Two tries at the indoor glider marks have produced national records in Classes A and B in both the Senior and Open groups. Art Wells broke the present high time of 55.6 secs. in Class A Senior; Manuel Andrade did an impossible 60.4 secs. in Class A Open; Wells repeated again with a 54.6 flight in Class B, beating the mark of over 6½ years standing established by Bob DeBatty of Chicago; and Pete Demos broke the Class B Open record with 1 min., 3.8 secs. All marks were established with various versions of the basic design first laid out by the Demos brothers.

With the return of good rubber the indoor flimsies have been flying high. Frank L. Cummings Jr., better known perhaps for his impressive contest record with free flight gas jobs, broke Anthony Becker's indoor hand-launched Class B Open Stick mark with a 23:37.8 flight in June, only to have Becker come back with a 24:16.8 flight less than a month later. Also worthy of note is Tom Greet's flight of 22:54.6 in Senior hand-launched Class D Stick, which broke his former mark by well over 7½ mins. The records of both Becker and Greet came as the result of the permission obtained by Jessie Bieberman, of Philadelphia, to use the Lakehurst, N.J., dirigible hangar.

Towline glider enthusiasts appear to have concentrated on the Class E records, and the fact that their efforts have been successful is shown by the 35:25.2 flight recorded for Richard Ehman of Hartford, Conn. in the Junior division; the 32:40.1 for Keith Teter, Elkins, W. Va. in Senior; and the astounding 45:26.0 achieved by Richard Enseki, Sr. of N.Y. in the Open division. In outdoor rubber, Jerry Kolb of Cleveland, Ohio hung up a 12:23.6 3-flight average to take the honors in Class D Open Stick.

Two free flight gas records in one day! This dream of every free flight gas flyer came true for Gene Parsons of Knoxville, Tenn. last July 4th when 3-flight averages of 19:22.0 in Class A and 18:56.0 in Class C, both in the Senior division were recorded for him. Parsons' Class A mark was broken by James Forrest of Rutherford, N.J. with 21:59.7. Jack Zanks, Bloomsbury, N.J. flyer, now leads the list in Class A Open with 11:01.3. Stan Silverman of Brooklyn has the Class B Senior record with an even 8½ mins. In Class C Open, Emidio DiTullio has been forced to yield to Charles P. Martin of Nashville, Tenn. whose ship floated to a new 3-flight average of 23:30.0.

Any and all attempts to list the progress of control line speed records in all classes would consume more space than we have here. As this is written, Class II speeds are approaching 90 mph, Class III ships are being clocked at well over 100, and the record in Class V is in the neighborhood of



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(Source of unsolicited letter furnished on request)

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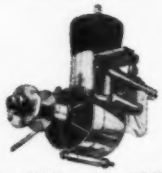

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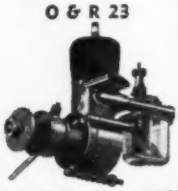

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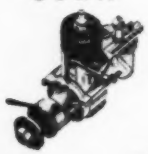

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125. These three examples are intended to give the reader an idea as to the progress made in control line, but from the manner in which speeds have progressed steadily upward, it's a reasonably safe bet that all present marks will have been exceeded by quite a large margin by the time this appears in print.

Revised Procedure for Licensing AMA Contest Directors Being Prepared

In the past it has been the policy of the AMA Membership Committee to provide contest directors' licenses to regular leader members. This procedure obviously required additional information regarding experience in the field of model aviation by the leader member applicant.

Because of the rapid growth of the activity, it is becoming apparent that many experts or specialists are of necessity being developed in the course of organizing clubs, planning club programs, organizing contests and conducting contests. Normally, all these people are leader members of the Academy and, for the most part, hold contest directors' licenses. As in all phases of our existence these complicated days, it is found that in addiition to the expert modeler and the experienced contest director, there is need for many other specialized abilities. An experienced man in organization and administration would probably provide much more effective club leadership than an expert contest director. Likewise, the many details in preparing for a model meet require different talents and abilities than those needed in actually conducting a contest. Yet, no one is of more importance than another; each contributes his share to a smoothly running organization.

It is in consideration of these facts that the Academy is revising its procedure in issuing leader membership and contest directors' licenses. As has been done formerly, leader memberships will continue to be conferred in three categories; Administrative, Scientific and Industrial. However, additional application forms will accompany the regular leader membership application so that qualified individuals may apply for contest directors' licenses. These new application forms will require some additional information as to experience in conducting contests, activity in the field of model aviation and other pertinent facts.

This change-over will be made effective January 1, 1948, the beginning of the fiscal year for AMA leader memberships. All necessary explanations and information will accompany the renewal notices which will be mailed to leader members just prior to the end of this year. Additional information, of course, may be obtained from AMA Headquarters.

Help Wanted!

As you read this issue of MODEL AIRPLANE NEWS the AMA Contest Board and its several subcommittees are hard at work putting final touches on the revised rules and regulations to be announced on November 30 and which will become effective January 1, 1948. No further changes in the rules will be made until November 30, 1948.

The important fact, however, is that you still have time to help these committees by giving them your suggestions and assistance in improving our national rules and regulations. Specifically, these committees would like to know your suggestions for free flight, control line and scale. Let them have your ideas for aerobatics, precision, novelty, flying scale and speed in the control line categories, and of course they need your help in determining the majority wishes in regards to crossection, wing loading, power loading, contest procedure and the other controversial features encountered in connection with free flight. Send your suggestions to AMA Headquarters where they will be placed in the proper hands.

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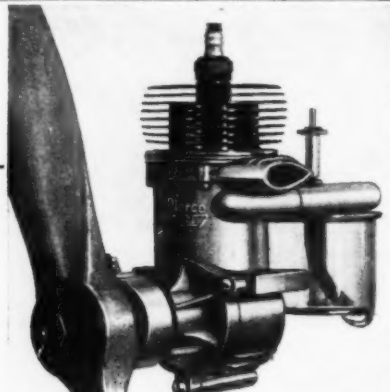

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Design Forum

(*Continued from page 14*)

stability. It is hard to believe, but it is a fact, that only twin pusher models were flown in contests during the 1920's. There may have been one or more isolated tractor models entered but these were a real curiosity and gave very poor performances. The reason for poor tractor performance was chiefly the lack of longitudinal stability due to stabilizers being too small—too small because they were made the same size proportionally as on full scale airplanes. The stabilizer area of full scale planes is usually equal to about 15% of the wing area. The break came when modelers increased the size of their stabilizers.

For instance, the author suggested to Carl Goldberg in 1927 that he make the stabilizers of his indoor models about 33% of the wing area. At that time very small stabilizers with inverted camber were used. Carl took this suggestion seriously and soon his ships were outflying all others. This feature spread until all indoor models were using larger stabilizers, and soon even successful outdoor models of the tractor type appeared here and there at contests. This one feature, *large stabilizers*, solved the whole problem of longitudinal stability, other factors being equal.

Since then stabilizers have increased in size until many are sometimes as large as 50% of the wing area. With this adoption of the large stabilizer, twin pusher designs were completely abandoned in favor of tractors about 1931 and throughout the 30's the efficiency of tractors, both rubber and gas powered, progressively increased.

Some interesting aerodynamic reactions resulted from the use of large stabilizers. For instance, it was found that the center of gravity could be placed considerably back of the position considered normal for full scale airplanes, that is, about 30% of the chord back from the wing leading edge. Many models now are flown with the CG 60%, 70% and even 100% of the chord length back of the leading edge.

Fig. 1 illustrates the normal position, often used on models. The fact that the CG is forward or back is unimportant in itself. The *reactions* it produces, however, are very important. First of all, stabilizers may be set positive to the thrust line and therefore contribute to the lift and support of the airplane, whereas in the normal full scale airplane or when the CG is forward in models, pressure on the stabilizer is downward instead of up, reacting as an added load that must be carried by the wings.

The improvement in flight with positive stabilizers was obvious immediately. Models flew with greater buoyancy and record times increased. Another reaction not apparent to most modelers resulted from the rearward position of the CG. The tendency to dive after stalling was materially reduced. A stall is often referred to as being dangerous; actually there is no danger in a stall. Danger comes from the *reaction* to a stall, which is a dive when the CG is located forward of the center of lift. Nearly all full scale airplanes react in this manner and consequently a stall is thought of as being extremely dangerous whereas actually the trouble lies in the dive resulting from a stall.

Fig. 2A shows an airplane with forward CG position, at the point of stall. Fig. 2B shows how the forces operate to create a dive. The CG, being forward of the lift

force "L" on the wing, creates a nosing over couple. This becomes effective because the downward pressure on the tail is zero or actually becomes an upward pressure, contributing to the nosing over couple.

Now look at Fig. 3. The CG is back of the lift force when the plane stalls as in Fig. 2A. Instead of a nosing over couple resulting, the lift force and the CG produce a stalling couple. The CG in conjunction with the upward pressure of the stabilizer produces a nosing over couple. The two are approximately equal, the tail couple usually being slightly greater because the wing is stalled while the stabilizer is still lifting. As a result one neutralizes the other, and instead of a sharp nose dive resulting the model settles gradually as indicated by arrows 1, 2, 3, 4, while the nose drops slowly until normal level flight position is attained. When this point is reached, the model usually has regained flying speed and continues on its way. In this manner the dangerous dive is eliminated and the "bite" taken out of the stall.

This has been done thousands of times in models and in fact was demonstrated deliberately on one occasion to a prominent aerodynamicist to show how the danger of stalls could be eliminated in full scale aircraft. The model used in this demonstration weighed 7 lbs. and had a span of 10 ft. In fact it was a miniature airplane rather than a model. We have suggested from time to time during the past 15 years that large airplane designers adopt this feature to cure the bad effects of stalls. Few have paid attention, perhaps because the Civil Aeronautics Authority does not sanction the use of lifting stabilizers which are required when the CG is placed back of its customary position.

A Frenchman of versatile mind has adopted and applied this principle to full scale aircraft. Mr. Maurice Delanne created the distinctive DL 240 monoplane, in which the horizontal tail surface is nearly as large as the wing. The CG is back of the customary position. In fact the whole plane employs the setup that model builders have used for 15 years. Both its flying efficiency and stability are phenomenal and exceed those of other airplanes designed with forward CG.

Richard Bideaux evidently favors this type of airplane because he has sent us a sketch, Fig. 4, of his idea of what a transport plane should be. He uses the principal of a large lifting stabilizer. In fact it is so large that the plane gives the appearance of being a biplane with sharply staggered wings. Mr. Bideaux claims a cruising speed of 200 mph, a top speed of 250 with a land speed of 50 mph with only 36' span. He gives us no scientific data to verify these estimates, but such a performance is well within the realm of possibility with this type of airplane.

So you see that free flight modelers are confronted with some pretty involved problems. This perhaps is what makes it interesting to the inquisitive ones, those who are continually searching for something new and better and not merely using model flying as a pleasant pastime.

Now let us consider U-control. Here the chief concern in the past has been speed. Some have flown U-control models for the purpose of stunting, acquiring an amazing amount of agility in maneuvering their ships. This direct action of controlling the plane while in flight by hand dexterity rather than planning its stability and performance before

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it takes the air, as in free flight, is probably the factor that intrigues the U-control enthusiasts: it is the thrill of action and response to their guiding hand.

In U-control the problem of stability, however, is practically eliminated because a model that would be absolutely unstable in free flight can be flown with complete stability at the end of control wires. Stability is assured regardless of the plane's design by attaching the wingtip to the control wires so that the plane is held steady as it circles. The chief design problem is speed, stability is practically absent. Thus U-control builders lie awake nights figuring how to cut down drag on their models. They have streamlined them to a remarkable degree, polished their surfaces until they shine like glass and shaved wings, stabilizer and fin critically thin. As a result, speeds as high as 130 mph have been recorded and competition now waxes hot among the experts in this type of flying. The burning question is: How can we make them fly faster? It would seem that the limit has been reached, but someone is always pushing the record forward a mile or two per hour.

George Marshall sends us a design that

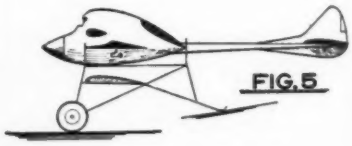

FIG. 5

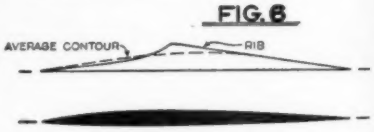

FIG. 6

FIG. 7

embodies some interesting features, Fig. 5. First, he uses a pod form of fuselage which, strange to say, gives less drag than a long slim fuselage of equal cross-section. It has been found that the best proportion for a streamline shape is a length equal to 3 times its maximum width. A pod with this streamline ratio with a boom extending rearward to hold the tail surfaces gives very little drag, especially when the engine is cowled as indicated in Marshall's plane.

It has been customary to leave the motor exposed to the airflow. This however creates tremendous drag, and greater speeds cannot be realized until they have been properly and efficiently cowled. There should be an opening at the front of the cowl to allow air to enter, and an opening at the rear for an exit. Air passing out of the rearward opening, in fact, will help reduce drag even below the normal amount.

Mr. Marshall shows a peculiar type of wing advocated by Roy L. Clough, Jr. He infers that this wing is more efficient than the normal streamline wing. In this, however, we are inclined to differ with him and will be pleased if he will indicate in any report or results of tests of such a wing that it gives less drag relative to lift than thin wings of streamline shape. It is true that maximum camber may be 50% of the chord or more back of the leading edge, but a sharp break in the upper surface as indicated will disrupt the airflow and cause ex-

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cessive drag with little increase in the lift. Actually, when Mr. Clough used this contour for the ribs of his speed job, shown in the September 1946 issue of M.A.N., the average crossection of the wing that resulted did not conform to the contour of the rib. The sag between the ribs was so great that the average contour was similar to that shown dotted in broken line Fig. 6.

Only at the rib and very close to it is there a break in the form of the upper wing surface similar to the break shown in the rib contour. For high speed work we suggest a section similar to the one shown in Fig. 7. Here the nose is sharp, the camber low, and the undersurface is given a slight negative camber to provide wing thickness and strength.

Mr. Marshall has also attempted to increase his speed by designing his plane for high speed flight rather than providing a large wing for takeoff which, when in flight, creates excessive drag. To get off the ground and into free flight he provides a dolly with an auxiliary wing attached to it. This assists the model to take off and is tripped by climbing the model sharply when normal speed is attained. We predict that the future holds great promise for speed flying.

Exact scale prototypes of full scale airplanes may be constructed and flown with U-control. In this way their flight characteristics may be determined to a considerable degree. These include stability characteristics and reactions to the controls in flight. To obtain an accurate measure of stability, however, the wings must not be attached to the wires. The model must be free to roll about all its three axes. As an example, interesting data may be obtained concerning new supersonic designs. Although the flight speeds of such models will not approach supersonic levels, some valuable information can be realized about the lower speeds required for landing such craft. Youthful pilots may in fact get the feel of the control of these supersonic types, and new tailless designs of unusual and even freakish forms may be tried out in this way, whereas it would be impossible to obtain information concerning their reaction to controls when in free flight.

So we see that each of these types of flying has its advantages. Whether or not they will contribute to knowledge and possibly be valuable in future research depends entirely upon those who operate them and the use to which they are put. They may be used as playthings or as scientific instruments. In every case, however, a large measure of pleasure will come to those who participate in this ultra modern pastime.

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Uniplane

(*Continued from page 25*)

dihedral. The ship banked like a speed boat and lateral control was available right up to maximum angle of attack, something not possible with ailerons when maximum angles run twice as high as on the conventional plane.

Originally, the *Uniplane* had twin rudders with a floating elevator between, but the elevator failed to function at high angles of attack. Elevons were then built in on the trailing edges near the tips and hooked up the same way they were on the original model. They functioned well mechanically but had more drag than lift at high angles and caused an awkward landing and a damaging nose-over. In rebuilding, the elevons were re-rigged as elevators and a high feather-like single rudder replaced the twin rudders. This was a safety precaution in case another nose-over occurred. However, the rudder was too sensitive and was cut down about a third. A lag in lateral response to rudder action was finally overcome by removing the stabilizer fabric. This necessitated a new floating rudder without stabilizer.

There still was resistance to left turn against engine torque which was ultimately corrected by putting a dorsal fin over the center of gravity in front of the windshield. Thus a vertical stabilizer was necessary after all, but not in its usual place. Actually, the final arrangement turned out to be the same as on many sailboats and outboard racers.

During this two year period of trial and error, numerous incidents and accidents tested the design as long distance flights could hardly have done. Altogether, over 100 flights were made during this period, practically all of them by a novice with but one hour conventional instruction on a Cub, bearing out the claim that it was a foolproof plane.

Of the eight flights attempted outside the airport with the undependable engine straining at its inhibited rpm, only two were completed back to the airport. These were of 4 miles and 8 miles duration at not over 300 ft. The six forced landings were the best sort of accidental tests, demonstrating the *Uniplane's* ability to land almost anywhere without serious damage. In one case it bounced across two low ditches flanking a dirt road—with an undertaker driving up to see if there might be a little business! Another time, blinded by the sun, the pilot unknowingly pancaked into the only backyard for a mile around, setting down between the privy and the back porch. A real estate subdivision, a corn field, and a cabbage patch were also visited. With a tricycle landing gear and wheel brakes, a tennis court would not have been too difficult to negotiate.

As to the future of the *Uniplane* type of design, it appears excellent. Zimmerman's Chance Vought version indicates it can have the highest speed range of any type of aircraft if wingtip, articulated propellers are used for hovering. Other promising fields are: the transport, in which there is popular demand for a safer type of airliner that can crash-land anywhere without injuring the passengers; the supersonic which has certain transonic and subsonic requirements only the *Uniplane* design apparently meets; and the private ownership field in which the Roadable-amphibian version offers maximum utility. The latter is now undergoing the early stages of development.

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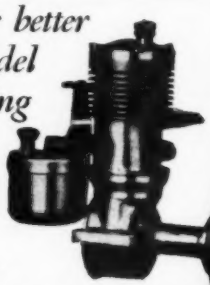

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Plane on the Cover

(*Continued from page 19*)

powerful in production and it was selected for the new fighter. The General Electric I-40, developing 1650 lbs. of static thrust, was the most powerful turbojet engine then available in the U.S. and the requirements of the design made it obvious that this amount of thrust was not enough to do the job.

Navy officials contacted British Air Ministry officers who suggested a new, experimental engine for the project. This was the DeHavilland Halford H-1B turbojet engine which had already demonstrated an output of better than 2500 lbs. of thrust, with the promise of much more through increased operating temperatures. This unit was designed by Maj. F. B. Halford following conferences with the Ministry of Aircraft Production in January 1941. Halford, Chairman and Technical Director of DeHavilland Engine Co., suggested two changes to the Whittle design which have had far-reaching consequences. He eliminated the double-sided impeller and designed the "straight-through" combustion chamber, replacing Whittle's reverse-flow combustion chambers. Both these innovations later found their way into the General Electric-Allison I-40 unit. The first Halford H1 engine was completed in April 1942 and was flight tested in a Gloster *Meteor* in March 1943. The engine was rated at 2000 lbs. of thrust during the flights but it has been continuously developed until today, as the *Goblin* installed in the DeHavilland *Vampire* fighter, it is rated at better than 3000 lbs. of thrust.

Navy officers arranged for several of these Halford engines to be brought to this country and, after thorough analysis, the decision was made to use it in the new Curtiss fighter and to arrange for its quantity production in this country. Negotiations with Allis-Chalmers and DeHavilland were successfully concluded and A-C received a license for manufacture of the engine.

An interesting sidelight during the period was the astonishingly rapid completion of the first Lockheed XP-80 fighter, which was designed and built in just 143 days. This hot pace outstripped the production of the early G-E I-40 units by several months, and Gen. Arnold obtained one of the Halford engines to permit the XP-80 tests to go ahead without delay. As a result, when the Lockheed XP-80 *Shooting Star* made its first test flight on January 8, 1944, with the late Milo Burcham at the controls, it was with a DeHavilland Halford H-1B turbojet engine installed and *not* the GE I-40 now used!

Further flight test data on the Halford engine has been obtained with a Grumman XTB3F-1 flying test stand, which has provided valuable operational data on the engine.

In the meantime, design work on the XF15C began to take shape and wind tunnel model tests were started. This proved the craft unstable in a spin and intensive effort went into solving the problem. Various arrangements of the tail units were studied and the most satisfactory was the design with the horizontal surfaces placed high atop the vertical tail. Although this arrangement gives the XF15C an odd appearance, the location provided the airplane with satisfactory spin characteristics when no other location would.

Poor spinning characteristics are normally the result of "blanketing" of the

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1/16 x 1/2	.2c
3/32 x 3/32	6..5c
3/32 x 3/16	.1c
3/32 x 1/4	3..5c
3/32 x 3/8	.2c
3/32x1/2	3 1/2c
1/8 x 1/8	6..5c
1/8 x 3/16	.1c
1/8 x 1/4	3..5c
1/8 x 3/8	3..5c
1/8 x 1/2	3 1/2c
1/8 x 1/4	3 1/2c
1/8 x 1	6c
3/16x3/16	2c
3/16 x 1/4	2c
3/16 x 3/8	2 1/2c
3/16 x 1/2	3c
3/16 x 3/4	5c
3/16 x 1	7c
1/4 x 1/4	3 1/2c
1/4 x 3/8	4c
1/4 x 1/2	5c
1/4 x 3/4	7c
1/4 x 1	8c

5/16 x 5/16	.5c
5/16 x 3/8	.6c
5/16 x 1/2	.8c
5/16 x 5/8	.9c
5/16 x 1	.12c
3/8 x 3/8	.9c
3/8 x 1/2	.10c
3/8 x 3/4	.12c
3/8 x 1	.16c
1/2 x 1/2	.12c
1/2 x 1	.14c
5/8 x 5/8	.15c
5/8 x 1	.18c

BALSA 36" PLANKS

1/2 x 2	.20c
3/4 x 2	.25c
2 x 2	.55c
1/2 x 3	.30c
3/4 x 3	.35c
2 x 3	.90c
3 x 3	1.40

BALSA 36" SHEETS

1/32 x 2	7c
1/16 x 2	8c
3/32 x 2	9c
1/8 x 2	11c
3/16 x 2	13c
1/4 x 2	16c
3/8 x 2	17c

1/32 x 3	10c
1/16 x 3	11c
3/32 x 3	13c
1/8 x 3	15c
3/16 x 3	17c
1/4 x 3	19c
3/8 x 3	25c

BALSA BEVELED 36" TRAILING EDGES

3/32 x 3/8	3c
1/8 x 1/2	4c
5/32 x 5/8	5c
3/16 x 3/4	6c
5/32 x 7/8	7c
1/4 x 1	8c

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Ercoupe	2.00
Zephyr	1.00
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Jabberwock	1.50
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Won 207 points out of possible 210 points
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1st. First Place, STUNT CONTEST—won 2680 points
(Beating 2nd place by over 900 points!) Drone executed all the maneuvers in the book, as listed above PLUS: Passed-the-vertical-dive, 5 consecutive square loops, inverted level flying, recover from inverted position, consecutive loops, square loops, power-stalls, etc. Drone's performance surpassed many large "C" engines!

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SPECIFICATIONS: Class B. Displ. .297 Bore 21/32 Stroke 7/8" Weight 9½ oz. Prop. 6"-18" Compression Ratio 18/1. RPM averages 2000-12000

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vertical tail surfaces by the horizontal surfaces. As the tail swings around and the airplane drops downward, the air moves up past the horizontal tail and towards the vertical tail. The horizontal surfaces, consequently, blanket a portion of the vertical surfaces so that they are useless in contributing a stabilizing influence to the airplane. When the horizontal surfaces are set well forward of the rudder and fairly well up on the fuselage, the blanketing effect may be small and the spin recovery characteristics satisfactory. The layout of the XF15C would not permit this and the fin-top location of the horizontal surfaces proved necessary and highly effective.

Another problem associated with jet aircraft tail surfaces is the highly turbulent exhaust from the tailpipe. The jet expands very rapidly after leaving the nozzle, creating a large area of turbulent air which is detrimental to the flow over the tail surfaces. It is necessary, therefore, to place tail surfaces high out of the path of this turbulent air in order that good control be maintained. A better solution however, and one used in the great majority of designs, is the location of the jet behind the tail so that the turbulent air problem is not created.

The layout of the XF15C is generally similar to the Ryan FR-1 but differs in one major respect: location of the turbojet engine. In the Curtiss it was decided to place the engine in the belly of the fuselage rather than directly in the fuselage as in the Ryan. The P&W *Double Wasp*, driving a four-blade Hamilton Standard propeller, is located in the nose and jet exhaust stacks collected into dual manifold exits on either side of the fuselage are used to utilize the additional thrust provided.

The location of an engine in the nose posed a problem in designing a tricycle landing gear and required additional structure in the lower forward fuselage. The gear folds rearward through clam shell doors which seal the opening after retraction. The main gear is located in the wing and folds inward with small panels sealing the opening.

The pilot is located atop the fuselage and is enclosed in a bubble canopy. The tricycle gear permits good vision forward on the ground or carrier deck, and the location of the wing provides excellent vision forward and down.

The XF15C-1 weighs approximately 8 tons (as compared to 4 tons for the FR-1) and has a 50 ft. span. The Navy's design in these composite-powered fighters has been more than established through flight tests, and this type aircraft is superior to any other in general all-round performance.

Rate-of-climb at sea level of the XF15C-1 is considerably better than the AAF's P-80, indicating that for interceptor duty the XF15C could contact an enemy aircraft at the 20,000-ft. level far sooner than could the super-fast P-80. Its range is well over that of the P-80, being nearly twice as much on the fixed fuel supply and even greater when its two extra 300-gal. tanks are installed. This range is made possible by using the turbojet engine of the XF15C only for a heavily-loaded takeoff, after which it is shut down and the flight made only on the economical reciprocating engine. At point of contact with the enemy, the jet engine is switched on and all the advantages of the jet fighter are exploited in combination with the fast acceleration and rapid rate-of-climb of the engine-propeller combination.

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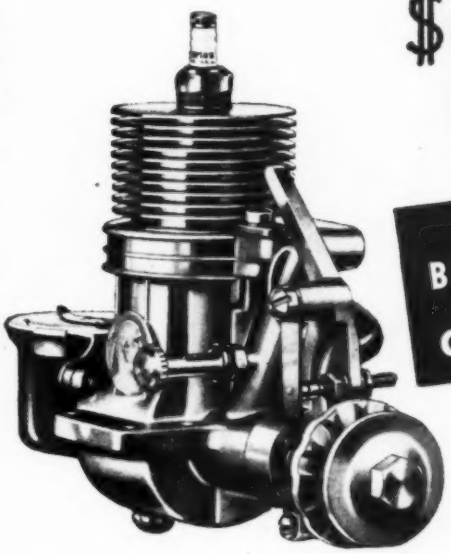

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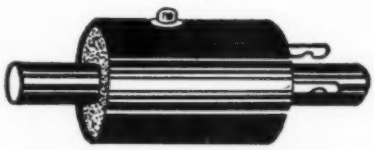
SPECIFICATIONS

DISPLACEMENT — .299, B Class
Bore — .760 Stroke — .660
R P M — 2,000 to 10,000
Weight with gas tank — 7 ozs.



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2. Obtain your entry blank from your dealer or send a stamped, self-addressed envelope to Genie Models Contest, Box 99, Old Chelsea, New York 11, N. Y., asking specifically for the Genie Contest Entry Blank.
3. Enter your model, powered by a Genie 29 engine, in any A.M.A. Sanctioned Contest. It need not be a large contest — any event for which the A.M.A. has issued a sanction makes you eligible for the prizes. If there are no large contests being held near you, have your club conduct its next meet under A.M.A. Sanction.
4. You can win one of the Genie prizes even if you don't win or place in your contest. The entry blank will carry only the time or speed of your plane. Your Genie record will be compared with all other entries sent in and the prizes awarded on that basis.
5. *Your entry blank must be postmarked before midnight, December 1st, 1947.* Entries postmarked later than this will not be considered.
6. You may make as many entries as you wish. The contest is open to as many flights as you make with your model in A.M.A. Sanctioned Contests, but only one prize will be awarded to a contestant. In event of ties, prize money will be divided equally.
7. This contest is not open to employees of Genie Models, its Sales Representatives or its Advertising Agency.
8. Genie Models, manufacturers of the Genie Engine, will be the sole judge of all entries and their decisions are final.

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One of the vital combat factors is a narrow radius of turn, permitting fast turns inside the enemy fighter. The composite fighter has a smaller minimum radius of turn than the jet fighter and is, therefore, superior in maneuverability for "close-in" combat. It is easy to see why this is so. The turbojet fighter develops its thrust by its movement through the air. For example, a jet fighter sitting on the ground develops zero thrust, even with the engine racing and using maximum consumption of fuel. A jet fighter can run all day long on the ground and not perform an ounce of useful work. Only after it begins to move through the air does the jet airplane develop power. Obviously, when it is moving at low speed it is producing an equally low output, whereas the engine-propeller combination develops its maximum horsepower at fairly low speeds. Therefore, at low speeds, such as during accelerations and tight turns in maneuvers, the propeller-driven XF15C has a considerably greater power and, therefore speed, than has the P-80.

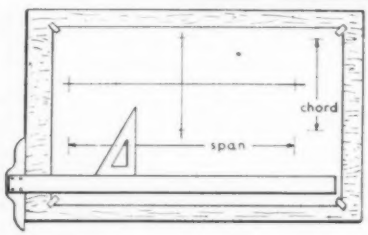
Summarizing, the XF15C has a lower maximum speed, higher rate-of-climb, lower radius of turn, shorter takeoff distance and much longer range than an equivalent turbojet powered fighter, and these capabilities fit the Navy's requirements to a "t". Another requirement it fits is the use of conventional gasoline for both engines, thereby simplifying the fuel system of the airplane and making it unnecessary to store a separate type of fuel on an aircraft carrier to permit its use.

The XF15C-1 has a span of 48 ft. and is 43 ft. 8-1/2 in. long. It weighs 12,500 lbs. empty and 16,500 lbs. fully loaded. It has a top speed of 470 mph at 25,000 ft. and a range of 1800 miles. It climbs at better than 5000 fpm and has a ceiling of more than 40,000 ft.

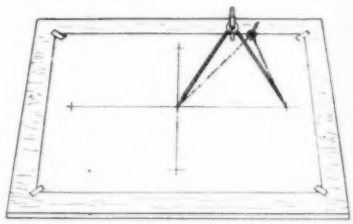
Three Curtiss XF15C-1's have been built, two fully equipped for flight tests and a third for static tests. Flight tests have been conducted at Curtiss Airplane Division's Buffalo, N.Y., plant and at Naval Air Station Patuxent, Md. Valuable lessons have been learned from the XF15C that will go into the design of other composite-powered Navy fighters, some of which are already under construction incorporating these lessons. The Navy is optimistic about the future of the composite-powered aircraft for carrier operation, and the XF15C-1 will be recorded as one of the pioneers of this new era.

EASY ELLIPSES

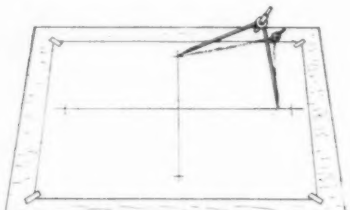
by J. R. Custin



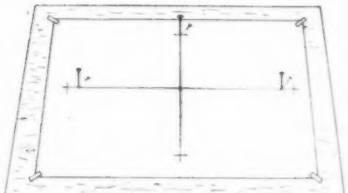
① LAY OUT SPAN AND CHORD AXES



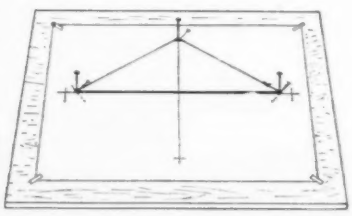
② PICK OFF THE SEMI-SPAN WITH A COMPASS



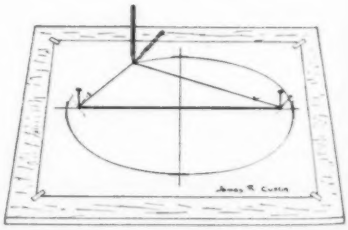
③ WITH CHORD EXTREMITY AS CENTER STRIKE ARCS INTERSECTING SPAN AXIS



④ DRIVE A PIN AT EACH OF THE POINTS WHERE ARC INTERSECTS SPAN AXIS, AND ONE AT CHORD EXTREMITY



⑤ LOOP A THREAD TIGHTLY AROUND THE THREE PINS



⑥ REMOVE PIN AT CHORD EXTREMITY. RUN PENCIL AROUND LOOP, KEEPING THREAD TAUT

Air Ways

(*Continued from page 23*)

Stanley Sieminski — Alan Ryder
Jack Norris — Thomas Trent
John Deal — Speed Ambler

• •

Picture No. 1 shows the newest jet fighter plane built by Otto Amrein, Wattstrasse 8, Basel, Switzerland. He calls it the *Santa-Monica*. It has a 3-1/2 ft. wingspan, weighs 5 lbs., has a Dyna-jet powerplant and was built from parts of American bombers which crashed in Switzerland.

Joseph Souhrada, 40 New St., East Islip, L.I., N.Y., submitted No. 2 of his FW190 A-3, built to 1″=1′ scale. He writes that he used actual perspective drawings of the major components of the real ship, and no rib or bulkhead was placed in position without first consulting the drawings. The fuselage was constructed in sections and spliced together. The canopy frame is built up accurately and requires only a plexiglass canopy and skin to complete it. The tail wheel is a faithful copy with steel springs duplicating the oleo action. The retraction gear is almost the same as on the real 190. The string seen near the tail pulls the gear up, and a rubberband tensioner pulls the gear down when pressure on the string is released. Tail wheel also swivels. The main landing gear also uses steel springs for oleo action and has movable torque links. The gear is fully retractable and may incorporate an electric retraction system. The wing is a slight departure from the real 190 wing as the outboard "floating" ribs and prefabricated skin could not be duplicated. However, the ribs and stringers are in their exact scale positions. The propeller is an exact copy of the V.D.M. electric propeller. The hub is hollow and splined to receive the engine crankshaft. Retaining rings and lock rings are built up to receive the propeller blades which are removable. An attempt was also made to duplicate the V.D.M. spinner. Two accurate 7.92 mm. machine guns sit in position with their ammunition boxes, cartridge chutes and gun mounts. Mr. Souhrada writes that the amazing thing about a scale job like this is that the parts just seem to fit together like a jigsaw puzzle.

No. 3 shows a Bristol F-2B Fighter built by J. C. Higgins, 4452 Abbott Ave. So., Minneapolis 10, Minn., from plans in Nov. and Dec. 1945 M.A.N. Scale is 1″ =1′, it has a 39-1/2″ wingspan, and is powered with an *Ohlsson 23*. Scaling up and building took six months' spare time. It was originally built to fly counter-clockwise, but Mr. Higgins found that he got better flights by switching the wires and flying it clockwise. A bad landing ended its career. Mr. Higgins is a member of the *Vapor Trailers*, a newly formed model airplane club. The fine photograph was taken by Henry Liljequist.

Carl Springer, 309 So. Broadway, Greensburg, Ind. sent in No. 4 of his *Skyfarer*. It has a 40″ wingspan and is a very stable flyer. The nose wheel is shock absorbing which has helped to smooth out many rough landings. The ship is rather heavy because it is covered with thicker paper than ordinary tissue. It is all white with red trim. Carl is only 13 but he has been building models for 4 years.

No. 5 comes from Don Chewinski, 234 Bowman St., Mansfield, Ohio and is the third coaxial helicopter he has built. Although it has seen many flights, it hasn't had a crackup. When the rubber motor is fully wound it rises to heights of

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SIMPLICITY OF DESIGN!

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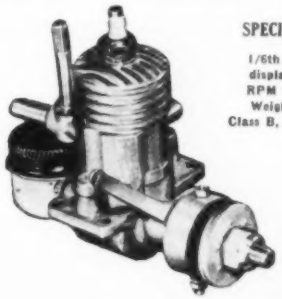
SPECIFICATIONS
1/6th horsepower
displacement .29
RPM 300-10, 800
Weight 4 ozs.
Class B, A.M.A. Rules



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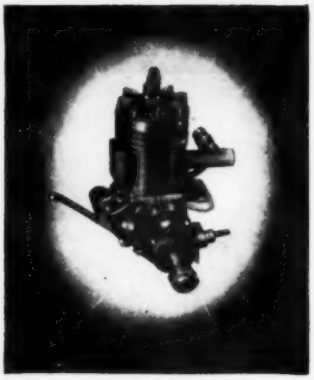

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4 Port 2 Stroke Cycle. 3/8" Stroke. 15/16" Bore. 300-7,000 R.P.M. Bearing Surface 1¼" Long. Crankshaft, 5/16" Diam. Rotation, Either Direction. Invertible. 1 5" H.P. Class C under NAA Rules.

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OR SEND $15.00 AND WE SHIP PREPAID AND INSURED

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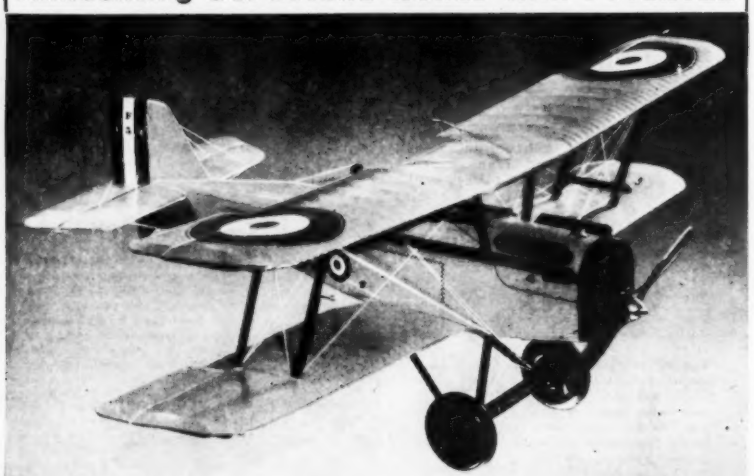
Announcing Our Second WORLD WAR I FIGHTER



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$4.95

(Less wheels and liquids)

You'll fly with pride this beautiful historical plane. Kit contains the best materials in generous quantity, preformed landing gear and clear, closely detailed plans. Also included are NAM's building manual and briefing sheet prepared exclusively for this kit.

A ***full-scale*** design from prop to tailskid! We have duplicated, within close tolerance, the exact lines and details of the original S. E.-5.

AT YOUR DEALER OR FACTORY DIRECT POSTPAID

NORTH AMERICAN MODELS

P. O. BOX 246 **BURBANK, CALIF.**

about 12 ft. in fair weather with no wind. (Photo by Richard Cook.)

Ray Sullivan, 405 B St., Petaluma, Calif., sent in No. 6 of his A-26 *Invader*, photographed by A. Wayne of Novato, Calif. This model is powered by two Atwood *Super Champions* and has a 5' wingspan. There are two separate ignition systems with common battery, and the switch is worked with a relay from a 45 volt battery on the ground. Flying weight is 8 lbs. 4 oz., but Ray writes that it is really a fine flyer. It has a complete set of controls including radar set, pilot, and radar operator with safety belts. In the nose are a 75 mm. cannon and four 50 caliber machine guns. Ray, who is president of the *Do Little Flyers*, writes that it took him 700 hours to build.

Roger Kelly, 509 Wellington St. E., Sault Ste. Marie, Ontario, Canada sent in No. 7 of his *Southern Belle* glider. He writes that a high wing loading made it do 40 mph without a wind. Roger seems to be having his troubles with people getting in the way of his models so he dashed off these lines in a lighter moment:

It's summer and again the heat
Will beat us to a cool retreat
To fly our many varied things
Like Messerschmitts and hot clipped wings,
And Thunderbolts and World War Fees—
While kids will pester you and me.

On flat dry land the lines are laid
And then, as if without our aid
Come hordes of bawling, yelling kids
Who find the plane where it is hid—
And then the whole mob gathers 'round
With yells and screams that shake the ground.

How pleasant it would be to flit
Around the circle with our ship
But minus folks who snarl the lines
And kids who just won't stay behind—
And dopey ones that know it all
And tell you so without your call.

It's summer and again the heat
Will find us running down the street
To fly our planes in open air.
But when the folks are everywhere
And parts are, too, I'll leave the lot
And bee-line home to the glueing pot.

No. 8 comes from Bob Beardsley, Box 12, Waldport, Oreg. The *Blue Beetle*, powered by an Arden .099, was constructed of solid balsa. It was all scrap except for the upper wing. Bob writes that this model wasn't fast, but it was nice to handle. He suggests that a drop or two of lighter fluid works wonders in freeing the wheels after soldering.

Ralph Rahn, 722A W. Wright St., Milwaukee 6, Wis., submitted No. 9 of his Martin B-10 built to the scale of ¾" = 1'. This gives it a span of 55". All control surfaces are movable, and the turret revolves. Wings and empennage are Army yellow, and the body olive drab. The body is built up and covered with 1/16" sheet balsa and the wings and empennage are covered with gas model Silkspan for added toughness.

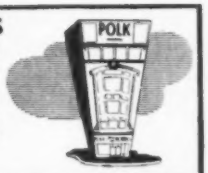
Francisco L. Uribe, Apartado Aereo 824, Medellin, Colombia, S.A., sent in No. 10 of his U-Control model equipped with an *Ohlsson* 23. Plans were obtained from a commercial kit, but modifications were necessary to reduce the weight because in Medellin the motors lose a good part of their power at the altitude of more than 4500 ft. above sea level. The wings are covered with silk and the fuselage is made with planking. The airfoil is thinner than that of the original. However the general lines, proportions and finish are that of the *Stardust*. The model has turned out to be a good flier with excellent flight characteristics and stability. It has already been flown 50 times without serious damage, and speed is estimated to be 60 to 70 mph.

(*Turn to page* 58)

POLK'S

INVITES YOU TO VISIT OUR HOBBY SHOWROOMS
IT'S A YEAR ROUND HOBBY FAIR AND EXHIBIT!

See our permanent exhibits of built-up models in Chicago and New York. You'll always find the latch string out at Polk's two big showrooms. It's a fascinating, year 'round display that will keep you busy looking for hours. If it's a model item you'll find it at Polk's. Come in and get acquainted.



ZOOMER!

CLASS A, $3.50 CLASS B & C, $6.95

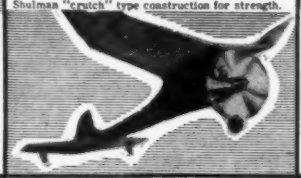
Lt. Leon Shulman really opened his bag of construction tricks with the popular, high-flying, contest-winning "Zoomer". Sensational high rate of climb, slow sinking speed. Light, graceful, easy-to-build, works equally well with gas or diesel engines. Has won numerous meets this season and can put you in the championship class, too. Features the famous Shulman "crutch" type construction for strength.

MERLIN - $6.95

Here's the proven, dependable Merlin "Super B" engine with coil and condenser at a never-before-equalled price. Formerly, $21.50, now available while quantities last at less than 1/3rd that price. Specifications: Bore, 11/16" displacement .232 cu. in., bare weight, 5¼ oz. All moving parts mirror-finished for longest life. Tungsten and platinum points for trouble-free operation. One of the exceptional values of all time - send order now.

MITE-BEE - $4.95

America's most versatile control line model, the 5-in-1 job that uses either Class A or B engines. The saucy, fast-stepping "Mite-Bee" can be constructed 5 different ways: Straight hi-wing racer, Gull wing stunt biplane, Lo-wing speedster, Straight wing bipe. Gull wing sport monoplane. Wingspan, 24" length, 20". Three dimensional plan features 5 different 3-view drawings plus photos of each type and many detailed construction views.



Nieuport 17C.1

One of the famous "Fighting Five" World War I pursuit jobs which has been modeled in scale in a new, easily-built, practically self-flying control line model. Watch this beauty as she flashes by & you will know why so many are taking to the air. Wingspan, 27", length, 17½". One of France's best known fighters, engineered to fidelity scale. Kit contains all necessary materials and highly detailed plan with separate instructions.

NIEUPORT 17C.1 Kit - - - - - - - - - - - - - - - $3.50

ATOM Engine $15.50

"King of the Small A's" is the minute, but mighty Atom, still unsurpassed for contest or sport flying-either free flight or control line. Weighs a scant 1-3/4 oz., disp. .099 cu. in., bore, .5", stroke, .5". Highest power to weight ratio in the model field. Less coil and condenser.

FOKKER D8

Sleek, high-wing monoplane fighter of World War I - a natural for control line stunt and precision flying. Known as the "Flying Razor", this very maneuverable ship was noted for its ability to make tight circles and loops. The same characteristics apply to this fidelity scale model. Wingspan, 26½", length, 18". Kit contains all necessary materials & a "super" plan with detailed building instructions. A beauty of a model from a beauty of a kit.

FOKKER D VIII - - - - - - - - - - - - - - - - - $3.50

Sopwith Camel

England's renowned pursuit plane of the first World War, a specially fine performer on the end of your control lines. With a 28" wingspan and a fuselage length of 18", the "Camel" is perfectly proportioned to turn in winning flights every time. You'll find this an easy model to build and fly, working from the super detailed plans and selected materials provided in the kit. Simplified construction makes building this ship a pleasure.

SOPWITH CAMEL Kit - - - - - - - - - - - - - - $3.50

BUNNY - $1.25

For the economy-minded modeler, the Bunny "Plan Kit" is the ideal way to build control line models. The "Bunny" is a 19" wingspan, 17½" fuselage job and comes with a big 35" x 45" highly detailed plan, plus all printed balsa sheets and firewall. You make up remaining bill of materials from supplies already on hand. In this way, you get an extremely good model at a very low cost. And by being able to select the other materials, you do a better job, turn out a stronger model.

MOVO DIESEL

The best of the Continental and English diesels - top place winner in numerous foreign contests. By far the best compression-ignition engine available on the American market because of its easy-set adjustable compression head. Requires no ignition system, weighs only 5 oz. Displacement, 0.125 cu. in. Easy to start; smooth running. Quantities limited so order promptly. $21.50 each.

MOVOIL 65c

Specially blended Movo diesel fuel, half pint can.

FOKKER D7

One of Anthony Fokker's most famous airplanes and one of the first planes with cantilever wings. A particularly easy ship to build because of its square sided fuselage and even chord wings. Yet completed, it makes a very graceful flyer which will turn in consistent flights for precision and stunt events. Kit for 28" span job (fuselage length is 22") is complete and contains detailed, illustrated plans, building and flying instructions.

FOKKER D7 Kit - - - - - - - - - - - - - - - - - $3.50

WESTERNER

From out of the West comes this magnificent performer which is winning meet after meet. Available in 3 classes to fit every motor. Complete with 2 big instruction books by designer and champ flyer, Don Foote, peer of the west coast free flight experts and nationally known competition winner.

CLASS A Kit - 50½" span - - - - - - - - - - $3.50
CLASS B Kit - 61" span - - - - - - - - - - $4.50
CLASS C Kit - 88" span - - - - - - - - - - $5.95

SPAD 13C.1-$3.50

One of the most famous aircraft of all time - acclaimed in story and song - now available for the first time as a control model in complete kit form. It's a big 26½" wingspan, 20" length model capable of speedy flights and especially adaptable for precision and stunt events. One of the "Fighting Five" series and a perfect flying scale model. As this job flashes by on the end of your lines, you'll experience every thrill that the pilots of the full size planes did when they gave battle to the enemy.

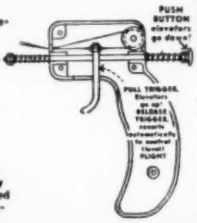
JEM Control Flight Handle $2.50

•FORMERLY $3.95

Whether you say "jem" or "gem" - here's the gem of all control line handles. The Jem handle is the answer to safe control line flying. It's an all-metal affair, shaped like a pistol grip to fit your hand, and has the very valuable feature of returning all controls to neutral as soon as you remove your fingers from the trigger or push button. It'll soon pay for itself in crashes averted and ships saved. The Jem handle is adaptable to any type of control. It works equally well with "U-Control," "Roller Control" & other systems.

NOTE THESE POINTS -

- The Jem Handle assures absolute positive neutral position.
- With the Jem Handle twisting or tilting has absolutely no effect on the control of the plane.
- Your plane can loop a dozen times, yet the twisting of the cables will not interfere with the control in the least.
- Fine, gradual adjustment of the elevators, either up or down, is done by the action of coiled springs controlled by your fingers - as slowly or quickly as you wish.



Automatically Returns to Neutral! Makes You an Expert Stunt Flyer

POL-K-OIL - $1.50

Heavy duty, 3 volt coil gives hot spark. Excellent for U-control and free flight alike. Assures top engine performance and easy starting. A money saving coil with high-price operation. Try one and you'll soon use no other.

FLEX-U-TROL

Stainless steel, 7 stand non-corrosive, non-kink control line wire used by the best flyers all over the country. Withstands 50 lb. test. Diameter, .015 inches.

100 FEET - - - - - $1.95
200 FEET - - - - - $2.50

"T-56" RUBBER

The famous championship brown rubber used by experts to win meets, set records. Used when U.S. won International Wakefield trophy. Sizes: 1/32 flat, 3 ft. 26; 1/16, 3 ft. 26; 3/32, 16 ft.; 1/8, 10 ft.; 3/16, 1½ ft.; 1/4, 25 ft.

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24" WINGSPAN

Free Manual with Lancer Combo. Description and illustrations on how to fly U-Control

LINE CONTROL

New type construction. No formers or struts. Just 4 solid balsa planks for body and wings. All parts printed or semi-cut. Build in a few hours. A constant flying ship. Complete with full-size plans, rubber wheels, control handle, cement, dope, etc., for $3.95 P.P. OR complete with our combo special $10.00 or with Ohlsson 23—$12.00 P.P.

READY TO RUN

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(Motor alone $6.95 P.P.)

COMPLETE GAS OUTFIT

Gas Propeller • Lancer Gas Model Kit • New Genie Motor • Rubber Gas Wheels • Control Handle • Coil and Condenser • Sullivan Control Wire • Complete. . . . $10.00 P.P.

Save $ $ $ FREE WITH GAS MOTORS

15 ITEMS FREE WITH EVERY GAS MOTOR ORDERED

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1592-N10 LINCOLN PLACE BROOKLYN 33, N. Y.

Send 3c stamp for 1947 catalog & Free Motor Hints Chart. Dealers write!

A. E. Bailey, 631 Crewe Rd., Wheelock, Sandbach, Ches., England sent in No. 11 of his stick pusher from a sketch by our staff writer, C. H. Grant. Ted Bailey and his friend, Pete Barlow, have completed 10 models in three months since leaving the Service. This model was a little deficient in wing area and tended to turn around the prop. A larger wing cured this and they had several nice flights of 40 secs. on half turns. However, they then proceeded to overpower it and found it wise to get out of its way!

No. 12 shows an Aeronca *Champion* powered by a *DeLong 30* built by John C. Porter, Jr., 410 Iris Place, Newport, Tenn. The model has 60" wingspan, 480 sq. in., 120 oz. power loading, and 10 oz. wing loading. Weight is 36 oz. It is yellow and red, and there are at least 10 coats of dope on every part of the ship. Cowling and wing are removable. John writes that local modelers are invited to fly at the local airport—Airport managers elsewhere please note!

News of Modelers

Gordon Snow, whose B-17G model appeared in the June issue, writes that he has been "snowed" under with letters from readers asking about the construction of his ship. He very kindly sent M.A.N. this further information:

The model was built from a kit purchased in Chicago. The fuselage and nacelles were inlaid with balsa wood. Wings and tail surfaces were planked with balsa. Ailerons and the movable tail units were covered with tissue paper. One can of water putty proved to be an excellent filler and also a suitable substance for fairing wing and tail surfaces. From odd bottles of old dope, he painted 20 to 30 coats of paint over the entire plane, sanding between each coat. The aluminum foil was obtained from a local hobby store for $1. There were 1800 sq. in., on the roll, the roll being 3" x 150' x the thickness of average tin foil. Before applying the foil to the plane, he first obtained a smooth, unscratched 8" x 10" glass pane and a 3" x 5" piece of plexiglass rounded on two corners and the edge between. He then selected the foil he needed (usually not longer than 6" for the wing strips and 2" for the fuselage strips). Putting the strip of foil on the 8" x 10" glass, he smoothed out the wrinkles, beginning at the center and working toward the edges of the piece of foil. The foil, as it was smoothed out, was rotated either to the left or right; this was done in order that the foil might be uniformly pressed out. The rivets were made by placing the aluminum foil (scraped side up) on a 1" x 6" x 20" board and making indentations using a clock cog or, better still, a leather tracer. A ruler served as a straight edge.

The adhesive used was 3-M *Trim Cement* obtained at stores where new auto tops and seat cushions are made. The *cement* is rubbed on the scraped side of the aluminum foil as well as on the surface area to which it will adhere. After drying for a minute, extreme care must be taken in putting the foil on the plane since the foil is held fast the second it comes in contact with the glue on the plane. Be absolutely certain that the rivets are in line and that there is no balsa wood showing through. Mr. Snow began at the tail of the plane and worked forward toward the nose. On curved surfaces he modeled the foil by exerting pressure with the plexiglass piece, holding the foil over the curved area and then pressing down. After

Announcing the NEW

K & B "24"

16.50
Less Coil and Condenser

Modelers everywhere demanded, "Give us a Torpedo for Class A (O-.25 Free Flight Rules) competition!!"
HERE IS OUR ANSWER! The K & B "24" is identical with the Famous K & B Torpedo except for displacement. The same engineers designed it... the same high grade materials are used... and it develops up to 8750 R. P. M. with 10" diameter free flight propeller.
Your Dealer Has *Both* K & B Engines. Order Yours From Him NOW!

SPECIFICATIONS

Bore	.862	Cu. in. displacement	.249
Stroke	.724	Bare weight	7 ozs.

K & B HALL OF FAME

Les McBrayer — Class 3 Open U-Line Speed
107.21 mph, Official AMA, 6/27/47
Troy Burris — Class 3 Open U-Line Speed
106.21 mph, Official AMA, 5/25/47
Leon Shelton — Class 3 Jr. U-Line Speed
83.72 mph, Official AMA, 9/1/46
(watch for more)
Records shown are with "Torpedo 29"

TORPEDO

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6901 EASTERN AVE., BELL GARDENS, CALIFORNIA

X-CELL SPEED

The PROPELLERS for MAXIMUM PERFORMANCE

60c

Here are the sizes and pitches you can get at your local model shop at the present time.

If your dealer cannot supply you, write direct. No C.O.D.s

8 inch diameter, 7 inch pitch "AA" for Atom and Arden engines.
8 inch diameter 8, 10, 12, 14 inch pitch.
9 inch diameter 8, 10, 12, 14 inch pitch.
10 inch diameter 8, 10, 12, 14 inch pitch.
11 inch diameter 8, 10, 12, 14 inch pitch.

The eight inch pitch propellers have been developed for those flying control line stunt models, and who want the best performance from their models.

There is an X-Cell propeller for every controlled model, large or small! Remember! Your engine or airplane, is no better than the propeller you hang on the crankshaft. The best is never too good for your model, regardless of age or appearance. You can always rely on the extra quality of X-Cell products for, better materials (the best eastern hardwoods), better finish (sanded and lacquered to a high gloss), and a complete diameter and pitch combination for peak performance. More records have been broken in a single year by X-Cell propellers, than by any other brand.

Designed and manufactured by modelers who understand the needs of model builders. X-Cell props are thoroughly field tested and improved for top performance. Since 1942, the makers of X-Cell props have been experimenting with pitch combinations in an attempt to give you the ideal propeller. You are now being offered the results of those experiments. The new X-Cells will give more acceleration, faster climb, and greater speed than ever before.

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The Two BIGGEST $3.65 VALUES in the model kit field

Licensed under Jim Walker U-Control Patent No. 2292416

Here's what you get in the Butch kit: All solid balsa wings and fuselage pre-shaped to sanding distance. No paper covering. Step-by-step photo plans for neat, easy assembly. Your finished Butch has a 28" wingspan and a 22" fuselage, and takes .23 to .45 cu. in. engine. Complete kit at your dealer's, or shipped direct from factory..... $3.65

MISS TINY

The "dream-girl" of thousands of modelers. Miss Tiny's collected hundreds of pounds of hardware in contests from coast to coast, and proven herself over and over again for honest, dependable flight performance. Power from .29 to .45 cu. in. Also converts from free-flight to control-line flying if you whack 4" off each wingtip. Standard kit with complete plans for easy assembly..... $3.65

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PACIFIC BI-LINE STUNT FLIER

Loops, Figure 8's, Flies Upside-down—duplicates almost any stunt known. Kit all balsa, no paper. Precision preshaped wings and fuselage, finished to 1/32 sanding distance. 24" wingspan. Complete kit..... $4.50

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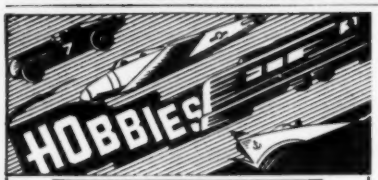

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several pieces of foil had been glued, he removed the excess glue carefully by using dope thinner, being extremely careful not to let any of the thinner run under the foil. If the excess glue is left on the aluminum foil too long, hard rubbing with the thinner and cloth will mar the surface.

The guns are hair curlers. The men were made by Mrs. Snow, complete with leather helmets, coats, pants and boots (sheeplined). Cooling fins on each cylinder were made by placing 8 or 9 door knob washers on doweling wood. The plane's fuselage is lighted by 5 interior lights.

* *

Edward Soltis, 57 Morningside Ave., Yonkers 3, N. Y., would like to correspond with model builders. His Class B *Zipper* left the meet at Bendix on June 22 and flew 25 miles to Scotch Plains, N. J., where it landed safely, was found, and returned to him. He is a member of the *Yonkers Gas Birds.*

Lawrence Lammens, who is interested in both control line and free flight models, would like to correspond with an American modeler. He is a member of the *Ghent Recreation Air*, and lives at 4 Marché aux Grains, Ghent, Belgium.

Anthony Massip, Phillips Exeter Academy, Exeter, N. H.; Mario Gonzales, San Lazaro 108, Havana, Cuba; and Bartolo Admirall, Campanario 957, Havana, Cuba are all Cuban modelers who wish to correspond with American modelers. Anthony would like to correspond with a modeler who is interested in radio ocntrol; and Mario and Bartolo would like to correspond with modelers interested in U-Control stunt models.

John Ray, 12 Drayton St. West, Park Brook, Walsall, South Staffordshire, England desires to correspond with a 16 year old modeler who would like to exchange M.A.N. for the "Aeromodeller." John has been building models for 2 years and is now going on to control line gas.

J. C. Kuyl, Roelof Hartplein 2, Amsterdam Z, Holland wants to correspond with an American modeler about diesels, hot fuels, free flight, props, and organization of meetings, as well as to exchange magazines, books and plans. He writes that lack of equipment confines gas modeling to only 25, but that his 11 year old *Brown Jr.* is still running well.

Philippe Catel, 4 Rue De La Madeleine, Brie, Comte, Robert, Seine-et-Marne, France, would like to correspond with an American of his own age (14-15) to exchange magazines, plans, kits, ideas, etc.

R. S. Knight, 237 Molesey Avenue, Surrey, England feels that there is not enough interchange of information on aeromodelling between his country and ours so he sent in a fine letter detailing his thoughts on many phases of modeling. He writes that the ease and safety with which the most beautifully finished and accurate scale models can be flown with U-Control makes a strong appeal to British modelers. Speaking of contests, he writes that British modelers regret they do not have the sponsorship of many large organizations behind them as our clubs do. Also, high winds and other difficult weather conditions make it necessary to design their models with these conditions in mind. Mr. Knight would like to correspond with an American modeler, preferably someone in the "expert" competition class. He has been modeling since 1939 and he is interested in all forms of model aircraft from helicopters to F.A.I. sailplanes, including all types of gas models.

Otto Stii, Amaliegade 36, Copenhagen K. Denmark wishes to correspond with an American modeler. He writes that he is just beginning to build models again after several years layoff, although it is still not possible to buy balsa in Denmark.

D. Richards, 17 Victoria Gardens, Exeter Rd., Smethwick 40, Staffordshire, England, a 17 yr. old keen aeromodeler, would like to correspond with an American modeler.

Club News

Alabama

The Alabama Wing of the Air Force Assoc., sponsored a regional model airplane contest at Brookley Field, Mobile August 1 in celebration of the 40th anniversary of the Army Air Forces. AMA sanctioned events included Speed (A, B, C Junior & Senior), Stunt (Junior & Senior), Combined Beauty, Special Event, and Flying Scale.

Arizona

A model airplane meet was held at Davis-Monthan Field, Tucson as the climax of Air Force Day commemoration on August 3. (See page 00).

California

San Francisco Recreation Department's *The Third Dimension* reported that Doug Smith of the Junior Museum is the proud possessor of a certificate from AMA which credits him with establishing a new national record for junior class E towline gliders. Doug's time was 9 mins. 10 secs. The previous record was 8 mins.

43.8 secs. held by Richard Ehman of Hartford, Conn.

• •

Northern California Model News announced the annual U-Control contest held August 24 by *Palo Alto U Liners*. Events included A, B, and C Speed and Precision in both Jr. and Sr. divisions, and Flying Scale.

• •

The *East Bay Aeroneers* cancelled their Semi-Annual Free Flight Contest scheduled for September 28. Due to the great amount of work involved, it has been decided that one big contest per year is enough.

• •

A new club called *Two-Cycle Terrors* was formed at Root's Hobby Hut, 6036 Telegraph Ave., Oakland. Meetings are held Wednesday nights at 7:30 p.m. The club has a plane and engine for training flyers who wish to learn how to fly and will hold classes on model building. The older and more experienced members will be assigned one night each week to teach the class.

• •

The *Napa Gremlins* staged their first annual control contest on August 31 at the Fair Grounds in Napa. Events included A, B, & C Speed and Precision, team, flying scale and novelty.

• •

Twenty-one U-Control fans of Ukiah recently united into a club that will be known as *Ukiah Modeleers*. They have a sponsor and are already planning a contest. The following club members were elected to temporary offices to get the club rolling; Pres. Gene Learnard; Vice Pres. Don Crawford; Sec.-Treas. Don Nassie. The city of Ukiah has donated space at Ukiah Airport and a fine flight circle is under construction. Headquarters for this new club is Gene's Hobbies, 903 S. State St., Ukiah.

• •

Sonoma Air Bears Model Airplane Club and the Sonoma Jr. Chamber of Commerce held a model airplane contest at Boyes Springs ballpark on June 8. Gen. H. H. "Hap" Arnold donated a beautiful trophy as club sweepstake prize which he awarded to Ray Sullivan, Pres. of *Do Little Flyers* of Petaluma. AMA of NC rules were used, and results were:

Speed

Class A Jr.—1. Eugene Learnard.
Class B Jr.—1. Bud Traversi; 2. Jimmy Eaglin.
Class A Sr.—1. Eugene Ageno; 2. Lorne Duffy.
Class B Sr.—1. Buzz Passarino; 2. Geo. Vignilo.
Class C Sr.—1. C. Fields; 2. Bob Dollar.

Precision

Class A Jr.—1. LeRoy Green; 2. R. Gleason; 3. Bud Traversi.
Class B Jr.—1. Dave Bennett; 2. Snuffy Duffy; 3. Bob White.
Class C Jr.—1. Snuffy Duffy; 2. Walter Maus; 3. Bob Stettler.
Class A Sr.—1. Howard Puckett; 2. Don Mitolo.
Class B Sr.—1. Howard Puckett; 2. Norma Pritchard; 3. Bud Hooper.
Class C Sr.—1. Ed Barefield; 2. F. Bradford; 3. Gene Learnard.
Appearance—1. John Hatch.
Team—1. Tom Frazer and Don Butman; 2. B. Hooper and Duffy.
Novelty—1. Don Mitolo; 2. Snuffy Duffy; 3. Ray Sullivan.

• •

The following new officers were elected by *Santa Rosa Sky Bugs:* Pres. Buzz Pasarino; Vice Pres. Al Cope; Sec'y-Treas. Elwin Millerick. Club meets at 527 Mervyn Ave., and they fly every Sunday at Santa Rosa Jr. College practice field.

Results of the Record Trials held by *Oakland Cloud Dusters* on June 22 in San Francisco Cow Palace were:

THE NEW SMITH
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20 LEADING DEALERS CAN'T BE WRONG!

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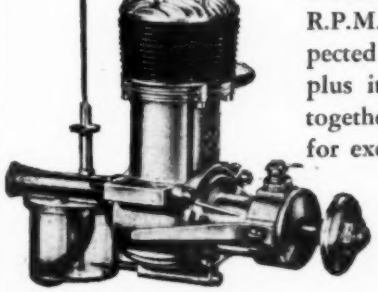
the new ball-bearing FORSTER "29"



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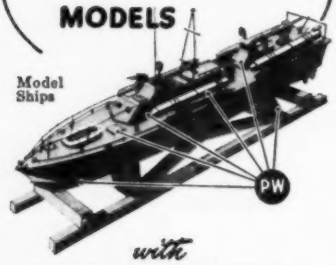

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Indoor Handlaunched Stick Class B—1. Carl Rambo; 2. Robert Blau.
Indoor Handlaunched Stick Class D—1. Carl Rambo.
Indoor Fuselage Model ROG Class C—1. Carl Rambo; 2. Michael Demos.

The F.G.M.A.C. News reported the following results of Fresno's 8th Annual Free Flight West Coast Championships on June 15:

Class A—1. Frank Broeg; 2. Fred Mosier; 3. Norman Peterson.
Class B—1. Francis Stewart; 2. James Leibee; 3. Dean Hughes.
Class C—1. M. Bertolucci; 2. J. R. James; 3. Chas. Hubbard.
Juniors—1. Russell James; 2. Fred Mosier; 3. Duane Carpenter.

Colorado

Sec'y. R. J. Beckman sent in news of the *Rocky Mountain Canaries* of Boulder. Originally organized two years ago as the *Windjammers*, the club name was changed last March. They held two meets: May 4, and June 15 in conjunction with the club in Longmont. They have been making fine showings at local meets, but Mr. Beckman points out that the average builder in his region lives at an altitude of 6000 ft. above sea level. Because of the rarified air it takes a lot more lift to get a given weight off the ground. This means more wing area, different airfoils, lighter construction. Another handicap is the fact that engines don't run the same at this altitude, nor do props behave in the same manner—quite a few items to be taken into consideration!

Connecticut

Secretary Robert M. Chapman reports the following results of the *Prop-Busters* First Annual Model Contest held June 22 at the Waterford Airport, New London:

Class A Junior (under 18)—1. Robert Leiper; 2. Frank Chapman.
Class A Senior (over 18)—1. Oscar Boyajian; 2. Dave Hunt.
Class B Junior—1. Sune Teinour; 2. Robert Swanson.
Class B Senior—1. Donald Grassi; 2. Robert Garnett; 3. Fred Schmidt.
Class C Junior—1. Richard Mourney.
Class C Senior—1. Frank B. Bushey; 2. William Paulson; 3. James Grant.
High Time of the Day—1. Donald Grassi.
Worst Crack-up—Ralph Morgan.

* *

Earl Gay, Contest Director, reports the following results of the Connecticut State Championships Control Line Meet held June 15 by *Bridgeport Aeronuts* with the sponsorship of the Bridgeport Herald.

Class A Speed—1. John Davis; 2. Homer Orton; 3. Charles Lee.
Class B Speed—1. Harry Sampson; 2. Lou Andrews; 3. Donald Mark.
Class C Speed—1. Lou Andrews; 2. Edward DeGeorge; 3. Ed Rogers.
Stunt—1. Mal Rhine; 2. George Fitzgerald; 3. Lou Andrews.
Beauty—1. Ben Rock; 2. John White; 3. Lou Andrews.
Helicopter Speed—1. Homer Orton; 2. Donald Mark; 3. Robert Hellman.

Illinois

Harvey Strato-Cats announced an all scale U-Control Contest to be held September 21, rain date September 28. Modelers desiring further information should write: Lester Gardiner, 15606 Lexington Ave., Harvey.

* *

Hart G. Betts of *Aurora Aeronuts Model Club* sent in the results of the model meet sponsored by The Exchange Club of Aurora on July 20 at Phillips Park:

Class A Speed—1. Dick Swenson; 2. George Urban; 3. George Urban.
Class B Speed—1. E. K. Waters; 2. Dick Swenson; 3. Joe Vermoch.
Class C Speed—1. George Sweet; 2. William Wirges; 3. L. Bertrand.
Class D Speed—1. A. Walderson; 2. F. Elaire; 3. L. Bertrand.
Stunt—1. K. Tucker; 2. Leon Tefft; 3. Ken Flagler.

Indiana

The Mid-Western States Model Plane Championships held at Schoen Field, Fort Harrison, on July 13 under sponsorship of The Indianapolis Star and The American Legion was a huge success. The results:

Junior Rubber—1. Bill Schwenneson; 2. Marvin Fromm; 3. Bob Keough.
Senior Rubber—1. Stanley Yeager; 2. Frank Garcher; 3. David Thomas.
Open Rubber—1. James Gaz; 2. Harry Burstein; 3. Norb Koenig.
Class C Gas (Senior and Open)—1. E. R. Simpson; 2. William Hutchins; 3. Sal Taibi.
Class C Gas (Junior)—1. Harry Snavely; 2. Don Becker; 3. Pat Kraker.
Class B Gas (Senior and Open)—1. Sal Taibi; 2. James Bennett, Jr.; 3. Robert L. Brown.
Class B Gas (Junior)—1. Luther M. Hays; 2. Galen Tibbett; 3. Bob Koehler.
Class A Gas (Senior and Open)—1. Charles Koby; 2. Jack Greene; 3. Andy Jeffries.
Class A Gas (Junior)—1. Gilbert L. Robbins; 2. Jack Canine; 3. Robert Earle.
Scale Event—1. Herbert G. DeBruyn; 2. Don Vollmar; 3. Bill Kleinhans.
Stunt—1. Harold Tremps; 2. Carl A. Ridgeway; 3. Norman H. Bartlett.
Combat—1. James Chillas.
Open—1. George Urban; 2. Cecil Handess.
Senior Open—1. A. P. Geiser; 2. Cecil Marsh; 3. James Chillas.
Class C Open Senior—1. Leslie H. Gerhardt; 2. Richard Fall; 3. Norman A. Schaer.
Class C Speed Junior—1. Bobby Heinlin.

Kansas

Ed Palenske Post No. 32 of The American Legion at Alma held their Fourth Annual Model Airplane Meet on August 3.

* *

Jayhawk Sundusters of Lawrence held an invitational control line meet on June 22 at Lawrence Municipal Airport. Floods in the vicinity cut down the number of contestants, but the contest ran off smoothly. High point winners of the day were: 1. Wade Mumaw, 2. Jack Fowler, 3. Fritz Probst, Jr.

* *

Plane Tips, official publication of *Wichita Planesmen*, reports the results of their recent election Pres. Darrell Miner; Vice Pres. Joe Yeager; Sec'y-Treas. Jack Brown; Publicity Chairman Richard Wallace; Contest Chairman Stan Chilton; Record Chairman Kenneth Crandell; Senior Adviser Jim McClelland.

* *

From *Dope Fumes*, official paper of Wichita's East Side *Hy-Flyer Clubs* and The Mid States Model Aeronautical Association, comes results of the 4th Annual Kiwanis-Y.M.C.A. Central States Model Airplane Meet:

Control Line Gas

Class I Jr.—1. John Williams.
Class II Jr.—1. Fritz Probst, Jr.
Class III Jr.—1. Mike Raymond.
Class V Jr.—1. Fritz Probst, Jr.
Class II Sr.—1. Jerry Shumaker.
Class III Sr.—1. Leon Shelton; 2. Jerry Shumaker; 3. Richard Wallace.
Class V Sr.—1. Jerry Shumaker; 2. Bill Boyd.
Class VI Sr.—1. Jerry Shumaker; 2. Bill Boyd.
Class II Open—1. Bob Hardesty; 2. Dean Zongker.
Class III Open—1. Nick Bates; 2. Frank Manley.
Class V Open—1. Frank Manley; 2. Bob Hardesty; 3. Bill Kirn.
Class VI Open—1. Frank Manley; 2. Bob Hardesty; 3. Jay Osborne.
Stunt—1. Leo Suellentrop; 2. Bob Arnett; 3. Fred Souchek.

Free Flight Gas

Class A Jr.——1. Howard Fenton; 2. Fritz Probst, Jr.

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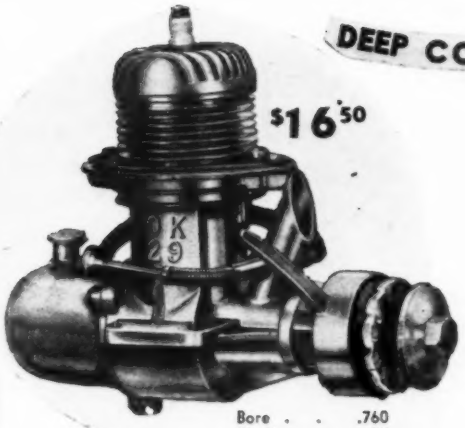

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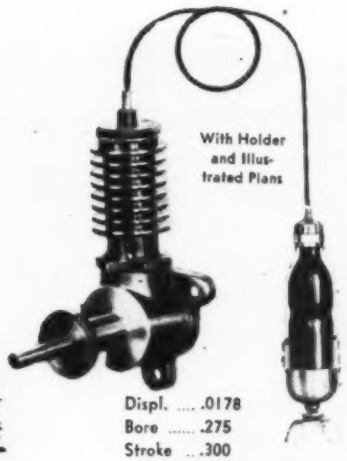

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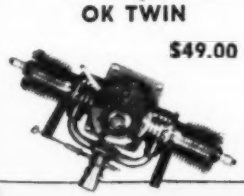

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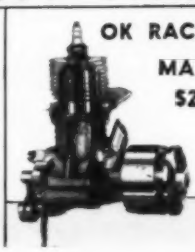
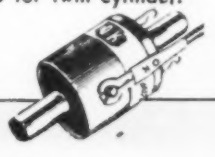


OK SUPER COIL
$2.50 for single-cylinder.
$5 for twin cylinder.



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Class B Jr.—1. Jerry James; 2. Dale Kirn; 3. Edward Galloway.
Class A Sr.—1. Joe Yeager; 2. Bob Hurford; 3. Harry Clarke.
Class B Sr.—1. Bill Roof; 2. Bob Hurford.
Class C Sr.—1. John Fisher; 2. Jimmy Brown; 3. Sinclair Buckstaff.
Class A Open—1. A. J. Wilds, Jr.; 2. Edwin C. Henry; 3. Nick Bates.
Class B Open—1. Nick Bates; 2. A. J. Wilds, Jr.; 3. LaVerne Koepsel.
Class C Open—1. B. L. Canady; 2. Edwin C. Henry; 3. H. J. Ottaway.

Rubber

Stick Jr.—1. Bill Kempton; 2. Nelson Gordin; 3. Bobbie Bain.
Cabin Sr.—1. Kenneth Dunlap; 2. Richard Wallace.
Stick Sr.—1. L. Schroeder; 2. Jack Brown.
Cabin Open—1. Jake Kroeker; 2. Ernest Linn; 3. Stanley Chilton.
Stick Open—1. D. R. Zimmerman; 2. Robert Dunham.

Glider

HL Junior—1. Wayne Bates; 2. Bobbie Bain; 3. Billie Bushenbery.
TL Junior—1. Bill Pendleton; 2. Bobbie Bain.
HL Sr.—1. Joe Yeager; 2. Carl Unruh; 3. Rolan Lynch.
TL Sr.—1. Carl Unruh; 2. Robt. Smith; 3. Richard Wallace.
HL Open—1. Robert Dunham; 2. Stanley Chilton; 3. Kenneth Crandell.
TL Open—1. Don Beard; 2. Carl Davis, Jr.; 3. Robert Dunham.

Dope Fumes also reports that in the glider contest held by the *Beechwood Hy-Flyers* on June 16 prizes were awarded to the following: 1. Jimmy McLain 2. Leon Edwards 3. Lee Epperson.

Missouri

Rex P. Barrett II, Contest Director of the 4th Annual Missouri State Model Airplane Contest, advised that floods made it necessary to postpone the contest from June 22 to August 10. Results will be published when received.

Nebraska

The following are winners of the Mid States Model Meet held at Omaha on July 20 and sponsored by the Jr. Chamber of Commerce with the assistance of Omaha Model Builders Council. Colin W. Campbell Jr. was Contest Manager, and Oscar L. Olson Jr. Contest Director.

Free Flight

Class A—1. Al White; 2. Carl Wright; 3. Bill Peck.
Class B—1. Warren Peterson; 2. Jack Schnobrick; 3. Larry Erickson.
Class C—1. Jack Fluehr; 2. Don Cline; 3. Bill Parmenter.

U-Control

Stunt—1. Harold Christensen; 2. Jas. Dreier.
Class A—1. C. W. Mumaw.
Class B—1. C. W. Mumaw; 2. Clyde Bourgeois.
Class C—1. C. W. Mumaw; 2. B. D. Baker.
Rubber—1. Herb Kothe; 2. Keith Homan; 3. Bob Eckland.

Nevada

The *Nevada Aveites Model Club* will hold their 2nd Annual Western States U-Control Contest in Las Vegas on Oct. 18-19. Ralph L. Wilson is Contest Director, and the club address is 628 So. 5th St., Las Vegas.

New Jersey

Linden Model Aircraft Club of Linden held their Annual New Jersey State Rubber Powered Championships on July 6 at the Sunnyfield Golf Course.

* *

Passaic Rubber Heels held their Northern New Jersey Model Airplane Championship Contest on July 13 at the old Delawanna Airport. Results were:

Rubber Fuselage

Class C and D—1. J. Nuszer; 2. J. Dyr; 3. H. Dore.

Rubber Stick

Class C and D—1. R. Horak; 2. P. Tierney; 3. F. Koditek.

HL Glider

Class B and C—1. J. Nuszer; 2. W. Fletcher; 3. P. Tierney.

One of the contestants ran into considerable difficulty when his model landed *much too near a bees' nest!*

New York

Prop Spinners Club was blessed with perfect weather for their Eighth Annual Northeastern Championships held on July 20 with these results:

Gas Class A—1. James Forrest; 2. Jack Zanks; 3. Jerry Stoloff.
Gas Class B—1. Stan Silverman; 2. Joseph Eder; 3. Charles Geyer.
Gas Class C—1. James B. Grant; 2. Chuck Brower; 3. Jack Greenspan.
Towline Glider—1. Richard Enseki, Sr.; 2. Robert Hess; 3. Gorden Johnson.

Westchester Aeronuts elected the following new officers: Pres. Jim Thompson; Vice Pres., Jack Donley; Sec'y-Treas., S. Freeman; Business Manager, A. A. Tiso. The club recently ran two chartered bus trips, one to Bendix, N.J. and the other to Bethpage, L.I. The club would like to increase its membership with contest minded, active builders. Address: 123 Fourth Ave., Mount Vernon.

Oregon

The *Oregon Aeromodelers*, an association of Oregon clubs, held the First Annual Oregon State Championships on July 4, 5, 6. Classifications included Jr., Sr. and Open events in indoor, free flight, and control line. Rex Baumgardner was State Champion with Jackie Hudspeth, Dick Nichol and Rex Baumgardner as high point winners in the Jr., Sr. and Open events respectively. Members of *Portland Gas Hoppers* and *Salem Cloud Chasers* acted as timers and officials during the meet.

Rhode Island

The Jr. Chambers of Commerce of Pawtucket and Providence and Pawtucket Exchange Club held the Second Annual All New England Model Air Show on Aug. 31 and Sept. 1. Events included Free Flight Gas (A, B, & C), Rubber (Stick & Fuselage Combined), U-Control Stunt, and U-Control Speed (6 combined classes).

British West Indies

T. M. Figueira, P.O. Box 176, Port-of-Spain, Trinidad writes that he and fellow modelers have started a model airplane club in Trinidad. Although it is still in the embryonic stage, these keen modelers are sure it won't be long before they are well established.

'47 NATIONALS!

As we go to press the 1947 Nationals are getting set at Minneapolis for the biggest meet in years. MODEL AIRPLANE NEWS has its editorial and photographic staff on the scene and will give you a thorough report in text and pictures, and a list of the winners . . . in the November issue of

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Ryan FR1	8.00
Fokker D-7	7.50
Vee Gee	10.00

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Sinbad	1.25	Floater	2.00
Super Sinbad	2.50	Thermic 70	3.50
Cosmo	1.25	Thermic 72	3.50
Thermal Ace	0.25	Eaglet	0.50
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1/16x3/16	1½c
1/16x1/4	2c
1/16x3/8	2½c
1/16x1/2	3c
3/32 sq. 3 for	4c
3/32x3/16	2c
3/32x1/4	2½c
3/32x3/8	3c
3/32x1/2	3½c
1/8 sq. 3 for	5c
1/8x1/4	2½c
1/8x3/8	3½c
1/8x1/2	4c
5/32 sq.	1½c
3/16 sq.	2c
3/16x1/4	3c
3/16x1/8	4c
3/16x1/2	5c
3/16x5/8	6c
1/4 sq.	3½c
1/4x3/8	4c
1/4x1/2	6c
1/4x5/8	7c
1/4x3/4	8c
5/16 sq.	5c
3/8 sq.	6c
3/8x1/2	8c
1/2 sq.	9c
3/4 sq.	15c

SHEETS

1/64x2	8c
1/32x2	8c
1/20x2	8c
1/16x2	8c
3/32x2	10c
1/8x2	10c
5/32x2	12c
3/16x2	14c
1/4x2	16c
5/16x2	18c
3/8x2	20c
1/2x2	22c
1/32x3	10c
1/16x3	12c
3/32x3	13c
1/8x3	19c
3/16x3	22c
1/4x3	25c
3/8x3	30c
1/2x3	35c

PLANKS

1x3	50c
1x6	90c
2x2	60c
2x4	$1.20
2x6	1.80
3x3	1.50
3x6	2.70
4x4	2.50
4x6	3.70

Beveled balsa trailing edges, 36" lengths

3/32x3/8	3c	3/16x3/4	6c
1/8x1/2	4c	7/32x3/8	7c
5/32x5/8	5c	1/4x1	8c

Propeller Blocks

8x7/8x1-3/16	6c	16x1-1/2x2	26c
10x1x1-1/2	10c	18x1-3/4x2	32c
12x1x1-1/2	12c	9x1-1/2x2	15c
14x1-3/16x1-3/4	18c	10x2x2-1/4	25c
Glider Wing Section		3x3/16x20	18c

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Soldering Lugs	6/5c
Fahnstock Clips	2/5c
Toggle Switch	50c
Slide Switch	30c
Tip Jacks, Set	60c
Pee Wee Clips, ea.	10c
Alligator Clips, ea.	10c
Spark Plugs, V, V2, V3, VR1, VR2, ea.	50c
Austin Timer	1.50
Arden Timer	2.50
Battery Box, Lg., Med., Sm.	0.40
Mounting Bolts	4/10c
1/8 I D Washer	6/5c
1/8 Lock Washer	6/5c
Alum. Mounts, Sm.	35c
Lg.	55c
Flexible Needle Valve	1.25
Neoprene Tubing, Ft.	25c
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Control Handle	75c
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Sullivan Reel & Hdl.	1.25
Music Wire, 3 Ft. 020 & 030, 3c; 035 & 040, 4c; 1/16, 5c; 3/32, 10c; & 1/8, 15c	
Tissue, All Colors	5c
Silkspan, 00	5c
Silkspan GM 10c,	3/25c
Bamboo Paper, Red, Yellow, Blue, Green, White ea.	10c
Balsa Props, 4"-4c, 5"-5c, 6"-6c, 8"-8c, 10"-10c, 12"-12c, 14"-16c, & 16"-20c	
Prop Shafts, Sm.	6/5c
Lg.	6/10c
Control Wire, 100' 010, 012, 014, and 016, 140	65c 75c
Flexible Leads	25c
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2½"	.50
3"	.60
2½" Heco Air Wheels	2.15
Heco Sponge Tail Wheels, Alum. Hub ⅞"	10c
1¼"	15c
Holy Arc 1½"	45c
2" 50c; 2½"	75c
Plastic Spinner	75c

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Hi-Thrust

Diameter	6" or 8" Pitch	10" Pitch
8" or 9"	35c	45c
10"	40c	45c
11"	40c	50c
12" or 13"	45c	60c
14"	50c	65c

Plywood ⅛x6x12	25c
1/16x6x12	25c
3/32x6x12	25c
¼x6x12	25c
Tubes Cement, Sm.	5c
Lg.	10c
Birch Dowels, 3" Parts in Stock. ⅛, 3/16, & ¼" ea.	5c
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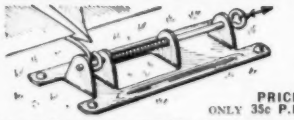

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8"—6 pitch	35c
9", 10" and 11", 6 pitch	40c
12", 13", 14", 6 pitch	45c
16", 6 pitch	70c
18", 6 pitch	90c

Left hand (Pusher)

8"—6 pitch	35c
10"—6 pitch	40c
12"—6 pitch	45c

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Model Airplane Course for Beginners

(*Continued from page 29*)

applying and tightening the tissue is similar to that described in Lesson 5.

Two 1/8" sq. strips about 4" long are cemented to top longerons of the fuselage. These are the wing rest strips serving to position the wing. Care must be used in applying cement to the strips; too much cement causes wrinkling of the tissue covering.

Construction of the nose plug completes the fuselage. The block shaped of soft balsa 1" x 1/2" x 3/4" is cut and sanded as shown. To serve as "positioner," a rectangular box of 1/8" sq. strips is made and cemented to the aft surface of the block. A hole of sufficient diameter to hold the 1/16" O.D. aluminum tube thrust bearing is drilled or burned through the block. The tube is then inserted and cemented.

Tail Surfaces—As indicated in diagrams, the tail surfaces are made of 1/8" sq. strip and 1/8" sheet balsa. The outline contours are traced from full size plans to the balsa sheet, cut out and sanded. The leading edges, spars and horizontal members are cut to size from the 1/8" sq. strips. Note that the stabilizer is made of two panels—one left and one right. The rudder consists of an upper and a lower section. The latter, made of 1/8" hard sheet balsa, is also used as a tail skid extending below bottom of the fuselage.

The frame of each tail panel is assembled on the plans, as was the fuselage. After the cement has hardened firmly securing the assembly, sandpaper the surfaces to desired streamlined shape indicated in the prints. Then cover the panels with tissue and spray lightly with water. Covering is applied to both surfaces (top and bottom) of stabilizer—and both sides of rudder.

Wing—The wing is constructed in two panels. Ribs and trailing edges are made of 1/16" sheet, while the spar and leading edge is of 1/8" sq. strip. The wingtips are made of 1/8" sheet.

The ribs are formed and notched to receive the wing spar as shown. After all of the wing components have been cut and shaped, the panels are assembled. By marking the location of each rib on the wing spar before assembly, it is possible to construct both wing panels with little effort. Leading and trailing edge is cemented to the ribs after they have been permanently joined to the spars. The wingtips are formed and cemented to the outboard surface of rib 7.

The wing centersection is covered with lightly sanded 1/32" sheet balsa to withstand any abuse that may result on attaching the wing to the fuselage with rubber loops. As indicated in plans, this covering is used on both upper and lower surfaces of the panels. The balance of the panel's area is covered with tissue (top and bottom). A rise of 1-1/4" is required at each tip. To achieve this a wedge shaped rib is formed of 3/32" sheet and cemented between the panels as shown in front view.

Propeller—The propeller is carved from a block of balsa 7" x 1-1/2" x 3/4". Procedure for construction is similar to that described in Lesson 3. In addition to this, however, the center or hub portion of the propeller is "cut down" as illustrated in Fig. 22.

A propeller shaft made of 1/32" music

wire is formed as shown, inserted through the aluminum thrust bearing and into the prop. The forward end is then shaped as illustrated in drawings and inserted into the prop. A liberal coating of cement insures permanent location of the shaft in the prop.

Before the prop has been fixed to the shaft, a small bead or 2 washers are placed between the nose block and the prop.

Assembly—To assemble the model we cement the tail surfaces to the fuselage as shown and allow cement to harden. A pair of 1" dia. wheels are slipped onto the landing gear. A drop of cement at the axle outer end prevents their falling off. The wing, as illustrated, is retained on the fuselage by a 1/8" flat rubber loop.

Powerplant—Two loops of 1/8" flat brown rubber furnish the motive power for our ship. Each loop is about 14" long. A third loop may be added after the builder has familiarized himself with the model's flying characteristics. Lubricant may be used to "soup-up" the power.

Balance—Balance point for the completed model should be about 1/3 back from the wing leading edge. Correct balance for flight can be attained by moving the wing as required.

Flying—Instructions for correct procedure on flight testing and flying the model were given in detail in previous lessons, especially in Lesson 3. It is advisable therefore to refresh your memory by reviewing same. Although you will be flying outdoors the procedure is essentially the same. Care, of course, must always be exercised to launch the model into the prevailing wind.

Flight experience with this sturdy outdoor flyer will prove of immense value in preparation for the CO_2 powered model to be covered in our next lesson.

And, now before leaving you, let's dig into our mail pouch and see what questions can be answered in this lesson.

* *

Charles Meyer of Philadelphia, Pa., asks:

QUESTION: What is the meaning of the term "Center of Pressure"?

ANSWER: It is that point on a given wing at which the pressure of air particles is equal to the sum of all pressure points over the entire wing. This point varies with the type of airfoil section used and the angle of attack.

Roger Kilty of Hempstead, L.I., asks:

QUESTION: What is the "Burble Point"?

ANSWER: It is the angle of attack of a given wing at which the airflow breaks away from the upper surface of the wing resulting in a "stall."

Send your questions to: Model Airplane News, 551-5th Ave., New York 17, N.Y.

West Coast Tips

(*Continued from page 6*)

We give this bit of information our number one spot because we think this is probably one of the really *good* things that has been done for modeling in California. If this organization really acts and grows (and there is every reason to believe it will), California and the entire West Coast may be able to swing a lot more weight not only locally but also nationally.

All of those far-sighted individuals who spent so much of their time and effort for this organization are to be praised and they should be well rewarded by seeing the results in a few years' time as the C.A.M.C. grows and grows.

We urge all California Model Clubs to join as soon as possible in order to have a say in how this new club operates.

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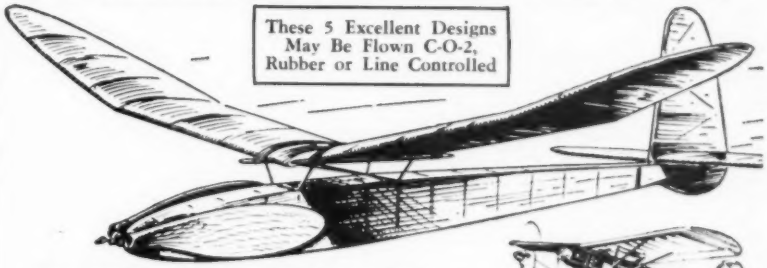

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Harvey Robbers, prexy of one of the most highly selective model clubs in the world, *Oakland Cloud-Dusters*, took us to task after the Monday night banquet at the Western Open for not giving the free flight modelers a play in our column. Mr. Robbers was right in his statement concerning the facts, but wrong concerning our reasons.

We have not given as much play to free-flight news because it seems to be hard to get. Every week we get news about control-line happenings. By phone, mail and word of mouth, we receive volumes of information—but it is *all about control-line flying*. Now we ask you, what would you do? We have printed pictures of free flight builders and their planes as a gentle hint that maybe we would write about them if we had it.

To get back to Mr. Robbers—we convinced him (partially at least) that we meant well, and so from now on we expect to have information about what happens in Oakland. Thank you, Mr. Robbers.

Incidentally, as a point of information, fellers, if you desire to pass on a little blurb about what is happening out your way, please remember that a monthly magazine is set up at least two months in advance and the news should be in by the 10th of the month to reach the stands two months hence.

For the convenience of any other free-flight clubs, our address and phone number are given herewith: JOHNNY DAVIS, 1975 No. Beachwood Drive, Hollywood 28, Calif. Phone: HOllywood 5758.

During the Western Open, Irwin Ohlsson suggested that we get a small group of boys together to take to the Army Air Forces contest August 3 at Tuscon, Ariz. The Base at Davis Monthan Field, in conjunction with the Eighth Air Force, was said to be offering $2,000 in prizes for a control line meet—which ain't hay, Jackson.

So we picked ourselves a team—a gang that sure gave a good account of themselves.

This meet turned out to be a contest of experts since very few inexperienced contestants were on hand. There were 200 entrants and 86 contestants entered all events. Aside from the 17 boys whom we took over, 41 more were sent by train from Los Angeles under sponsorship of Los Angeles dealers and manufacturers.

The prize list was really big: there were trophies worth a thousand dollars, plus another two thousand in merchandise. All this loot was donated by the business people of Tucson and by the 43rd Bomb Group which is stationed at this field. The parking ramps were used for flying areas and 7 circles were in use. The M.P. force at the field did a really good job of keeping the 21,000 spectators in order. In addition to relieving the contestants of the usual "wandering spectator" headaches, the meet managers had several other innovations that made things more pleasant for all concerned. One was the extensive use of Army field telephones, with lines from each circle to a central registry booth. This phone system made it possible to announce the name of a contestant as the latter went out to fly, assisted in keeping a running master score board, and generally speeded up the whole contest. Finally, a little touch that made a big hit with the fliers was the provision of a shelter tent right on the flying field where the boys could fill up with ice cold drinking water.

The Air Force had an exhibition of its wares that included a B29, radio controlled drones, radar and sonic devices, air-sea rescue boats, life rafts, etc.

The weather was beautiful, although the gusty wind that blew from 25 to 35 mph all day reminded the boys of Wichita last summer. The conditions were apparently much to the liking of the California boys, judging from the list of winners and the fact that several new speed records were made.

Now for the winners, all of whom came from the Los Angeles area except as noted.

	Engine	Speed mph
CLASS C SPEED OPEN		
Al Allen & Joe Kitchens	Dooling	134.83
James MacElroy (Phoenix)	McCoy	125.47
Wallick & Van Natta	McCoy	118.42
(*Note*—Allen and Kitchens set new official world's speed record Class 6 AMA—131.09 mph—on pylon).		
CLASS C SPEED JUNIOR		
Dick Grandell	Dooling	112.50
Parker Hubert	McCoy	106.50
Al Wadleigh	McCoy	98.36
CLASS B SPEED OPEN		
Wally Wallick & Bob Van Natta	McCoy	125.43
Newberger & Leasure	McCoy	124.13
Allen & Kitchens	McCoy	119.20
CLASS B SPEED JUNIOR		
Bob Behrens	McCoy	100.00
CLASS A SPEED OPEN		
Don Newberger & Wayne Leasure	Torpedo	114.64
Troy Burris	Torpedo	113.92
Ed Price (Phoenix)	McCoy	110.42
(*Note*—Troy Burris set new official world's speed record Class 3 AMA—110.42 mph—on pylon).		
CLASS A SPEED JUNIOR		
Richard Rigney	Torpedo	85.30
Paul Conrad	Torpedo	81.59
Bob Behrens	Torpedo	73.46
FLYING SCALE		
Bucky Monroe (San Diego)	Spad	
Bob Palmer	Lockheed Altair	
Frank Hernandez (San Diego)	Convair 240	
OPEN BEAUTY (BEST FINISH)		
Parker Hubert	Original Speed	
Ray Downs (Tucson)	Original Speed	
J. C. Yates	Original Stunt	

PRECISION OPEN
Bob Palmer; Bud Jamieson
J. C. Yates; Jack Gilroy
Don Gulotta; Doug Morgan

TEAM STUNT
Bob Palmer and J. C. Yates
Snafu Boys

SWEEPSTAKES AWARD
Al Allen and Joe Kitchens

AWARD FOR BEST ORIGINAL DESIGN
J. C. Yates

AWARD FROM 43RD BOMB GROUP FOR OUTSTANDING FLIGHT OF THE DAY
Al Allen and Joe Kitchens for breaking world's record in Class 6.

LADIES EVENT: Edith Downs (Tucson)
JET EVENT: Bill Connolly (Phoenix)

Well, there it is. It looks as if Irwin Ohlsson and Harry Rice started something when they began to take the boys around to contests. We certainly think they are to be praised for their efforts. Everybody has been on the fence for years and it remained for two old hands at the game to start the ball rolling. Oh, happy day!

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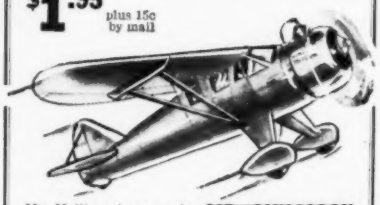

Mr. Mulligan is as much a part of air racing as hot dogs and soda pop — unquestionably the most popular of all racing planes. Mr. Mulligan affords an excellent model with great stunting possibilities. Mr. Mulligan won the 1935 Bendix trophy race at a speed of 238.70 M.P.H. Another "completely complete" kit featuring colored decals, formed gear and rubber wheels. Wing span 22"—for A and B engines.

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22" Wing Span
COLORED DECALS
RUBBER WHEELS
FORMED GEAR

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EXPERIMENT INCORPORATED
Products Division
RICHMOND 2, VIRGINIA
Racing Fuels for Two-Cycle Engines

Flash News

(Continued from page 2)

war-winning B-29 bomber. The B-50 has top speed near 425 mph mark and can carry the AAF's newly announced 42,000 lb. bomb. Although externally the B-50 appears to be a B-29 with four Pratt & Whitney *Wasp Major* engines and a higher vertical tail, Boeing engineers point out the B-50 is actually about 75% brand new through redesign of much of the structure for 75ST aluminum alloy, new landing gear and numerous internal improvements. Third big-plane in the news is the second Northrop XB-35 *Flying Wing* bomber, which has joined the first at Muroc Army Air Base. Total of 13 are to be delivered, followed by two YB-49 jet-propelled versions.

ANOTHER ROUND-THE-WORLD flight by millionaire pen-maker Milton Reynolds may well be underway as you read this. This flight will be across both poles and William Odom, Reynold's pilot, plans to use a Consolidated Vultee B-32 bomber if one can be found in good condition. The flight will cover 30,000 miles and will carry scientists to obtain data on the flight.

TWO MAJOR shifts in the lightplane field may indicate broad changes in ownership and financial structures in the field in near future. North American's sale of the famed *Navion* to Ryan Aeronautical followed suspension of production and an announced decision to drop the project. Ryan purchased the rights, jigs and tools and all drawings and data on the swift four-seater and is already in limited production. Texas Engineering and Manufacturing Co. slashed the price of the *Globe Swift* more than $1,000 following purchase of the airplane rights for $328,000. Immediate production is planned to exceed earlier figures by Temco, which has built the airplane for Globe for several months. The standard Temco Swift will sell for $3250. and the deluxe model for $3750.

THE FIRST jet-propelled transport plane may be flying as you read this, for the British Air Ministry announced that the Avro Tudor VIII is scheduled to fly early in September of this year. It is powered by four Rolls-Royce *Nene* turbojet engines. The Miles Marathon II, powered by *Mamba* propjet engines, is also scheduled to fly this year.

DETAILS ARE available on the first Russian jet fighter, which was flown over Red Square in Moscow during May Day celebration. It is a Lavochkin design powered by two German-built BMW 003A axial-flow turbojet engines. Air for the two engines, which are mounted side-by-side in the belly, is taken in at the nose and the ducts divide on either side of the pilot, who is located well forward in the nose. The craft has a 40 ft. span and is 35 ft. long. Estimated top speed is over 500 mph and it was built as a research airplane. Russia is continuing production of Messerschmitt ME-262, Nazi twin-jet fighter, and it is believed that the production rate is even higher than during the war. Following claims that the 262 outclassed the Lockheed P-80, AAF awarded a contract to Hughes Aircraft Corp. for exhaustive test flights of a captured 262 and another contract to Cal-Aero Tech. Inst. for tests of the Junkers Jumo 004 turbojet engines that power the 262. Although Russia, so far as is known, has no Russian-designed turbojet engines, both the BMW 003 and the Junkers 004 are available in Russia in considerable quantity and many experts believe that production in the German factories is continuing.

INSIDE STORY of the production of Martin XB-48 reveals it was built in a small, self-contained aircraft "factory" within the Martin plant in Baltimore, and from the first engineering drawing to flight test was a period of less than 14 months for this radically new bomber. The engineering and shop departments worked side-by-side with the wooden mockup nearby for constant checking. Raw materials were shipped into the secret area and procedures were short-circuited to get the job done in a hurry. The XB-48 is back at the Baltimore plant undergoing flight tests following its initial test flight, which took it to Naval Air Station Patuxent, Md.

RYAN XF2R-1 Navy fighter, powered by a turbojet and a propjet engine, recently attained altitude of 39,160 ft. in a long, sustained climb. Piloted by Al Conover, the *Dark Shark* was undergoing routine performance and climb tests when the record was established for turboprop aircraft. The XF2R previously had reached 10,000 ft. in 2 mins., which is only seconds away from the all time rate-of-climb record set by a Grumman F8F *Bearcat* at 1 min. 40 secs.

WATCH FOR the mighty Hughes *Hercules* flyingboat to fly any time now. The craft should be airborne shortly for two reasons: (1) static tests of the engines have about been completed with several hours of running time on each of the 8 P&W *Wasp Major* engines already chalked up; (2) Congressional investigation of the contract between Hughes, Kaiser and the Reconstruction Finance Corp. The quiz may quickly settle down to the simple demand: "Well, let's see it fly!"

CONSOLIDATED VULTEE is nearing completion on the XP5Y-1 *Skate*, powered by four Allison turboprop engines developing 5500 hp each. The *Skate* is claimed to be capable of getting off the water in an 11 second run.

AMIDST RUSSIAN CLAIMS of a guided missile supposedly twice as potent as the V-2, AAF recently released some figures on its future guided missile program. The giant craft is designed to have a 3000 mile range with a second stage designed for 5000 miles. Current program is directed towards development of a 300 mile missile controlled by a "mother" plane. The mother plane will cost about $4,000,000 but no details of its design or manufacture have been released. The missile will cost about $7,000,000 in prototype form, but quantity production is expected to reduce this to $270,000 each. The 5000 mile missile will require 10 to 15 years of work before it becomes a reality.

PROBABLY THE LAST British reciprocating engine Navy fighter is the Westland *Wyvern*, which looks remarkably like the Boeing XF8B-1. The new craft is powered by a 3500 hp Rolls-Royce *Eagle* engine. A

BEST IN FLYING!

for CO-2 and Mite or C.I.E. Diesel. Both kits contain instructions and material for 3 alternate power plants.
KITS: $1.50 ea. If your dealer cannot supply you, order direct adding 15c for packing and postage and include your dealer's name and address.

TOPPER Span 26"

KITS CONTAIN: Accurately cut sheets printed in bright blue lines, formed gear, hardware, plywood firewall, silkspan, full size plan and new type wing construction featuring full depth spars.

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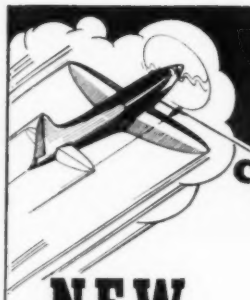

Twisted Control Lines Fly As One
Cuts Line Drag 25% Increases Speed 10-15%

NEW RECORDS

Now Made Possible By The Sensational New

CONTROL-IT and THUM-IT

The New CONTROL-IT and THUM-IT, Because of Their Unique Side by Side Control Line Arrangement, permit you to twist your control lines from 4 to 6 turns and fly them as one line — Actually Cuts Line Drag By 25%, and Consequently Increases The Speed Of Your Model From 10% to 15%. Control of the model is greatly improved and more of the engine's power is available for acrobatic maneuvers. Here is your chance to add those extra M. P. H. to win the top prizes for SPEED, or that extra power to complete that difficult maneuver. Install a CONTROL-IT in your present control line model or design your new job around a CONTROL-IT. Then, with the aid of a THUM-IT, Thumb Control Handle, you are set for new records in Speed or Acrobatic Flying.

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CONTROL-IT

A Completely Finished, Ready To Install, Elevator Control Unit for your Control Line Model. Precision Built for Precision Flying. Constructed of aircraft steel nickel plated finish, plastic parts and fitted with stainless steel aircraft control cable. It's tops in flying safety — will withstand a 100 lbs. pull test. Ideal for mid-wing, low-wing or high-wing models, clockwise or counter-clockwise flying.

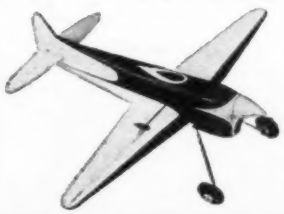
Complete, With Elevator Control Horn, Push-pull Rods and Mounting Hardware, Only..... $1.95

PATENTS PENDING

THUM-IT

100% Finger-Tip Control — You'll Like The Way Your Model Responds To The Slightest Touch Of Your Thumb. It's simple, precise and foolproof — ideal for speed and acrobatic flying. The flashy streamlined handle is molded of colorful, durable plastics and is equipped with stainless steel aircraft control cable — will withstand a pull test of 100 lbs.

Complete, With Safety Strap, Only..... $1.95



SHARK 6-5

ENGINE CLASS B&C WING SPAN 30"

A Sensational New Control Line Model, designed for the new Control-It and Thum-It. Construction Kit features completely finished forward wing panels and prop spinner; cut to outline shape cowlings, fin, rudder, stabilizer, elevators; printed out fuselage sides, etc.

Kit Complete (LESS CONTROLS) $4.95

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ENGINE CLASS B&C WING SPAN 30"

A Beautiful Twin Rudder Control Line Trainer designed for the new Control-It and Thum-It. The Construction Kit includes completely finished forward wing panels; cut to outline shape cowlings, rudders, stabilizer, elevator; printed out fuselage sides, etc.

Kit Complete (LESS CONTROLS) $3.95

DESCRIPTIVE LITERATURE UPON REQUEST

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This New Merchandise is now available at all leading Distributors. Send in your order today.

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24 HOUR SERVICE GUARANTEED

BALSA SHEETS—2x18
Base or Pine Cost 1½ Times Balsa
2 x 36 or 3 x 18 cost 3 times
3 x 36 or 4 x 18 cost 5 times
3 x 60 or 4 x 36 cost 7 times
3 x 60 costs 8 times—4 x 60 10 times

1/64 ....5 for 10c	5/32 ....3 for 10c	
1/32 ....5 for 10c	1/16 ....2 for 10c	
1/20 ....5 for 10c	1/4 ....2 for 10c	
1/16 ....5 for 10c	5/16 ....2 for 11c	
3/32 ....4 for 10c	3/8 .....6c ea.	
1/8 ....3 for 10c	1/2 .....7c ea.	

18" BALSA STRIPS
36" costs double. Sizes with * come in 60" too. Cost 5 times 18". Minimum order on 60"—$1.00.

1/16 sq.....20, 5c	3/16x3/8*....3, 5c	
1/16x1/8, 15, 5c	3/16x1 .....2 for 5c	
1/16x3/16 12, 5c	3/16x3/4* 21c	
1/16x1/4 .....8, 5c	3/16x1* ....3c ea.	
1/16x3/8.....8, 5c	1/4x1/4* 4, 5c	
1/16x1/2.....6, 5c	1/4x3/8* 3, 5c	
3/32 sq.....12, 5c	1/4x1/2* 2, 5c	
3/32x3/16 10, 5c	1/4x3/4* .....3c ea.	
3/32x1/4.....6, 5c	1/4x1* .....4c ea.	
3/32x3/8.....4, 5c	5/16 sq.*....2, 5c	
3/32x1/2.....4, 5c	3/8x3/8* ....3c ea.	
1/8x1/8*.....12, 5c	3/8x1/2 .....4c ea.	
1/8x3/16* 10, 5c	3/8x3/4* .....5c ea.	
1/8x1/4*.....6, 5c	1/2x1/2* .....5c ea.	
1/8x3/8*.....5, 5c	1/2x3/4* .....6c ea.	
1/8x1/2*.....4, 5c	1/2x1* .....7c ea.	
1/8x1* 2, 5c	3/4x3/8* .....7c ea.	
5/32 sq.*....5, 5c	3/4x1/2* .....8c ea.	
5/32x3/8*....3, 5c	1/8x3/4* .....8c ea.	
3/16x1/4*....4, 5c	3/4x1* .....9c ea.	

18" BALSA PLANKS
36" Costs Double, 60" Triple

1/4x1/4 08	1x6 45	2x6 90
1x1 10	2x2 30	3x3 75
1½ sq. 12	3x3 45	3x4 95
1x2 15	2x4 60	3x6 ....1.35
1x3 25	4x4 ....1.25	4x6 ....1.85

6" x 36" BALSA

1/16" ..25c	3/16" ..45c	½" 65c
3/32" ..35c	¼" 50c	¾" 70c
1/8" 40c	⅜ 60c	1" 75c

NOSE BLOCKS

1x2x1	5c	2x4x6 15c
1x2x2	5c	2x5x5 19c
1x2x6	5c	2x6x6 25c
1x3x3	4c	3x3x3 10c
1x3x6	7c	3x4x6 15c
2x2x2	3c	3x6x6 40c
2x2x3	5c	4x4x4 27c
2x3x3	7c	4x4x6 45c
2x2x6	10c	4x6x6 60c

PROP BLOCKS

1½x3x5	2c
1½x3x6	3c
2½x3x9	9c
3x4x11	40c
3x4x12	45c
3x11½x12	75c
3x11½x15	85c
11½x12x18	15c

36" TAPERED TRAIL. EDGES

3/32x3½ 3c	3/16x3¼ 6c
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10".. 9c	40c	45c
11".. x	40c	45c
12" 10c	45c	60c
13".. x	45c	60c
14" 12c	50c	60c
15" 15c	xx	xx
16" .. 90c	xx	xx
18" 1.00	1.00	

PLASTIC
2 Blade 3bl 4bl
1½" 2c 10c 10c
2" 2c X 15c
2½" 3c 15c 15c
3" 5c 15c 20c
3½" 10c 20c X
4" 15c 30c 30c
5" 20c 50c X

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single-seater, it is a general purpose type capable of carrying bombs, torpedoes or extra fuel for long range. A special feature are the landing flaps, which extend down below the wing trailing edge, similar to the pre-war Junkers system. Contra-rotating 4-bladed propellers are fitted. The Wyvern has a top speed of 455 mph and is armed with four 20 mm cannon.

DeHAVILLAND Aircraft is developing a flying wing airliner, scheduled to fly within the next 4 years. Capable of flying the Atlantic the giant craft, known as the DH 106, is to be powered by 4 DeHavilland Ghost turbojet engines, developing more than 5000 lbs. of thrust each.

THE NAVY announced that standard combat aircraft fuel in the future will be 115/130 octane grade, replacing the current 100/130 grade. This more potent fuel, used heretofore only for experimental purposes and war emergency use, will add the equivalent of about 10% extra power to Naval combat aircraft.

Gnat

(*Continued from page* 21)

up the wing for dihedral and force plenty of cement between spar junctures. The center juncture is made by pushing the spars on each wing half slightly out of line. Plank the leading edge with 1/16" sheet balsa which has been soaked in water to make it pliable and to prevent cracking as it is curved in place. The centersection (between ribs 1 and 2) is also planked on the bottom. Trim the leading and trailing edges to airfoil shape with a razor blade and sand well.

The elevator is similar in construction to the wing. The leading edge is soaked in water and held in place until dry with plenty of pins. The sub-rudder, of 1/8" sheet, is cemented to bottom of the elevator and a small former is fitted at the point where the elevator joins the fuselage. Small aluminum tabs on bottom of elevator prevent the attachment bands from cutting through the trailing edge.

FINISHING — Sand entire framework carefully with fine sandpaper and cover with silkspan or silk, using a mixture of 50% dope and 50% cement as an adhesive. The original ship was covered with silk dyed (for lightness) red (for visibility). Trim was in colored dope, kept to a minimum to avoid adding weight. Give at least 3 coats of clear dope.

FLYING—Like most pylon type ships, the *Gnat* is easy to get flying. Use about half throttle for first flights and keep the motor run very short until you ascertain the direction and degree of characteristic power turn. The ship will probably balance tail heavy. This is intentional since the desired type of glide is a small diameter circle to catch a thermal at a contest and stick in it. When flying straight it will stall in the glide, but when the rudder is turned the stall will flatten out into a wheeling, floating glide. If necessary to turn the rudder in the direction of the power turn to obtain the required amount of circle to flatten the glide, a little opposite thrust will be needed. Insert aluminum spacers behind the proper motor mount.

Remember that the perfect adjustment cannot be put in with just a few flights. I agree wholeheartedly with Louis Garami who once said that it took two weeks of steady flying to properly adjust a gas job. And after you get the ship flying just the way you want it, make the adjustments permanent. Keying of wing and elevator to make certain they are put back on in the same position every time they are assembled is very important!

Since I'm not one to resist the opportunity for even a corny pun, here's wishing "Gnats to you!" That's a joke, son.

Fuel Tanks

(*Continued from page 35*)

from the tank before the engine stops. The tank may be filled from a bottle or the like by means of a neoprene tube connected with copper tube E, and the tank can be emptied through E by inverting the plane. In place of tube E, a larger one with a screw or hinged cap can be substituted if desired. Tube D is a vent tube and receives a tight fitting wooden plug having a 1/32" vent hole drilled through it as in Fig. 6. A similar plug without a vent hole is used to plug tube E after filling the tank.

The pattern of Fig. 1 can be varied as necessary if you have an engine different than a 23 and if your plane is not a *Fireball*. One different arrangement is shown by way of example in Figs. 7 & 8. This tank also is supported independent of the engine. It has a "slip in" mounting with relation to engine bearers that form part of a crutch for a crutch type fuselage. The only fastening means required is the engine in front of the tank. The engine bearers are ¼" dowels which may be tapered from the wing back as full diameter is not necessary for the strength required, and the taper of course cuts down weight. The best method for tapering the dowels is by sanding them while they rotate in a lathe or drill press.

The tank sides have half-round grooves formed in them to receive the engine bearers as in Fig. 8. The arrangement of tubes A, B, D and E is the same as for the *Fireball* tank. The tank consists of two pieces of tin, one to form the top and sides and the other to form the bottom and ends. Cut and form the top and sides first, then cut and form the bottom and ends to fit them. Solder the copper tubes in position, then solder the tank walls together and test for leaks. When the tank is mounted on the engine bearers, it should be limited against rearward movement by the firewall of the plane and against forward movement by the stop lug of Fig. 7 engaging the crankcase of the engine. This lug is preferably of spring brass and soldered to the front of the tank.

As a finish for fuel tanks made of sheet tin, brushing lacquer is recommended. After trimming off excess solder along the seams use very fine emery paper, at least No. 600, to secure a smooth surface. Then clean the surface chemically with a solution of trisodium phosphate and water to remove all traces of grease; rinse the solution off with hot water and let the tank air-dry before applying the lacquer. If the lacquer is "flowed" on, one coat will be found sufficient for securing a professional looking job.

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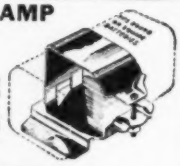

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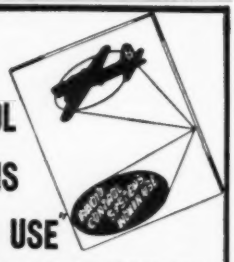

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World War I

(Continued from page 27)

was making for itself in combat. The result was that squadrons receiving *Camels* as replacements griped, fledglings feared being sent out on *Camels*, and transferees cancelled their requests for *Camel* duty.

To clear up the notion for all time that the *Camel* was a deadly killer to all who flew it, let's have a good look at it. The *Camel* suffered from the ever-present truth that any airplane, W.W.I. or modern, is a compromise between all factors entering into the design. In the case of the *Camel*, speed, maneuverability and climb were the essential qualities preserved, and the compromise resulted in some admittedly nasty tendencies.

The powerful rotary engines in the *Camels* were the culprits. Their gyroscopic action was more pronounced than in any other W.W.I. rotary engined airplane; this was the bitter with the sweet.

Flight Characteristics

Vague references have been made to the *Camel's* righthand spinning tendency. That characteristic was only part of the story. The *Camel* rolled beautifully to the right, but balked like a Missouri mule when the pilot rolled to the left. It just wouldn't do it! The engine's gyroscopic action tended to swing the nose to the right with the result that the ship would stand up on its tail and stall. To do a straight loop in a *Camel* you had to use left rudder because of the engine's action. And in a right-hand turn, if the nose began to drop the experienced pilot held up the nose with a little left rudder rather than with the stick.

Pilots who remembered these rules for flying a *Camel* were able to wring a great deal out of the little ships. The *Camel's* bad reputation was caused by pilots who either forgot or used poor judgment when the rotary began to take hold.

Camels have been accused of suddenly ducking under on their backs during a high-speed power dive. When this tendency was felt, the experienced pilot applied a little left rudder and lived to come home to chow. But the inexperienced or forgetful man used the stick, which caused the nose to drop further and he soon found himself unside down —with no wings! Those pilots who learned the *Camel's* idiosyncrasies well had no trouble making the little ship a tough customer for the German Imperial Air Service boys to handle.

Camel Construction

Four models of the Sopwith F.1 *Camel* were placed in production during 1917. Dimensionally, all were the same within limits of the engine variations which differentiated one from the other. The basic combat *Camel* was powered by a 110 hp Le Rhone. Two subsequent combat models were fitted with the Gnome monosoupape 150 hp and the 130 hp Clerget engines. A fourth model used for instruction purposes carried a 100 hp Gnome in its nose. Of the three combat types, the Clerget and Le Rhone models were most widely used. The Monosoupape was soon discarded until certain design changes could be made to handle the increased power. These design changes resulted in the second type *Camel*, the 2F.1, to be described next month.

As with all W.W.I. aircraft, limited

materials, necessity for speedy construction, and infancy of the art led to a simple structure. The fuselage frame was a girder type member composed of four ash longerons, spruce cross bracing and steel wire bracing. The upper deck aft of the cockpit was lightly made of plywood formers and stringers, while the forward deck and sides were a combination of plywood skins with sheet aluminum detachable cowls and access panels. The engine was enclosed in a typical rotary cowl of spun aluminum.

The engine was attached to the fuselage through a series of steel stampings and was separated from the cockpit section by a steel firewall. The castor oil tank which supplied lubrication to the engine was located high behind the firewall and had a capacity of 30 litres. Oil tanks were variously made of welded sheet aluminum or lead-coated riveted sheet iron. Fuel was carried in two tanks immediately behind the cockpit. The main tank, operating under air pressure from either an air or engine driven pump, contained 138 litres of gasoline. A gravity tank with a capacity of 32 litres for emergency was also provided. Combined they gave fuel for about 3-1/2 hrs. flight.

The pilot was provided with a roomy cockpit. The seat was adjustable, mounted on two rails attached to the fuselage structure. He sat with his feet almost touching the firewall. In front of him, in the center of the instrument board, was a manometer with safety valve, clock, pressure gauge, altimeter, compass, two magneto switches, tachometer, air speed indicator and pulsometer. On his right were the hand operated fuel system air pump for emergency use, and on his left were switches for the main and gravity fuel tanks, master fuel switch, main tank fuel level indicator and a Bowden cable release for bomb racks, when fitted.

Air for the pressure fuel system normally was supplied by a wind driven pump mounted either on the landing gear or on the centersection struts. The pressure head for the airspeed indicator, when fitted, was located on the front starboard interplane strut. Airspeed indicators were not fitted in some instances. A bomb rack under the fuselage carried four bombs for use in trench strafing. No bomb sight was supplied; these missiles were dropped by "guess and by gosh."

Landing gear of the Sopwith *Camel* F.1 was variously made from round steel tubing faired with spruce and from streamlined section steel tubing. In either case the split-type axle, hinged in the center of the tread, rested between steel tube spreader members and was sprung on rubber shock cord. Tread was 4 ft. 5-1/8 in. on tire centers. The tail skid was made of ash with a steel shoe and sprung with rubber cord from the sternpost. The skid was steerable on the ground to facilitate taxying maneuvers.

Wings of the F.1 *Camel* were exactly 28 ft. in span and both had a chord of 4 ft. 6 in. Gap was 5 ft. at the fuselage and 4 ft. 1-1/16 in. at the tips. The upper plane was flat, without dihedral, although some ships were specially rigged by individual pilots with 1 deg. dihedral. The lower wing was provided with 5 deg. dihedral.

In prototype F.1 *Camels* and in the first few production batches, stagger was positive 18 in. throughout the span. In later models, however, stagger was increased to 18-5/16 in. at the interplane struts only. Both wings were set at 2 deg. positive incidence.

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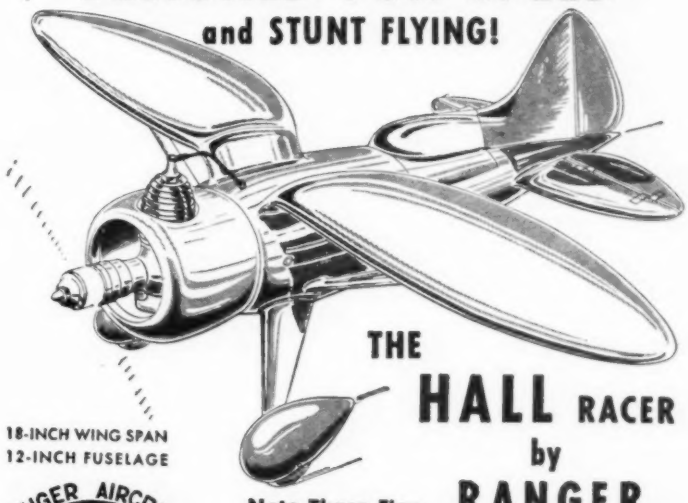

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Structurally the wings were made up of conventional wood spars, leading and trailing edges and with plywood ribs fitted with milled spruce rib caps. Spars in the upper wing were "I" section spruce. In the lower wing the front was of "I" section material but the rear spar was left solid. In crossection dimensions, front and rear spars of the upper wing were the same as corresponding spars in the lower plane.

Upper wing panels were attached to a broad centersection, which was in turn held off the fuselage by four solid, streamlined section spruce struts. A rectangular opening was cut in the centersection to improve the pilot's upward view. Lower wings were attached directly to fittings on the lower longerons. Interplane struts were solid spruce spindled to a streamline section. Interplane bracing wires consisted of conventional landing and flying cables. Later *Camels* were equipped with streamlined steel RAF wires. The *Camel* was one of the first single seat fighters, incidentally, not fitted with a nose drag wire. Ailerons fitted in both upper and lower wings were of the non-balanced type.

Camel empennage preserved the distinctive Sopwith outline: a small triangular vertical fin with rounded leading edge and a rounded unbalanced rudder; a fixed horizontal stabilizer and unbalanced elevator. The horizontal stabilizer, set at 1-1/2 deg. positive incidence, was a thick, symmetrically cambered plane. Empennage members were variously made of all-wood and wood with steel tube spars and outlines.

Performance details of the *Camel* in its production forms, a description of an improved and re-designed *Camel*, the 2F.1, and more information on the *Camel's* ability as a fighter, will be disclosed in these pages next month.

Scaling Plans

(*Continued from page* 13)

tion of a point in lieu of actual measurement is known as visual interpolation, and with a little practice one can become quite proficient at it.

When using this method, do not draw a continuous line from square to square, but make only points on the sides of the squares where the lines intersect them. After a number of such points have been established, hold the paper at a distance and check them by eye, or connect them up with a light pencil line. Minor variations in contour, not apparent close up, will stand out when viewed as a whole line or as a series of points, and the necessary corrections can be made. To use this method when working from library books, it is best to ink the original graph on a sheet of celluloid, and lay that over the three view, thereby avoiding damage to the book.

Another direct redrawing method is that involving the use of dividers. These are instruments similar in appearance to the familiar draftsman's compass, but instead of having a pencil on one end and a fixed point on the other they have points on both ends. The use of ordinary dividers is limited, however, to enlargement in such direct ratios as two, three, four, etc. To enlarge a given dimension two times, as illustrated, the dividers are set with one point at each end of the dimension and then transferred to the base line of the new dimension, one point being placed at the point of origin, while the other comes to rest at a point that proves to be just at the mid point of

the new dimension. Rotating the dividers about this second point brings the first point to rest an equal distance beyond the pivot point, establishing the far limit of the new dimension. To triple the original dimension, the dividers are rotated a second time, this time using the points alternately.

Another type of divider better suited to the modeler's needs—although not to his pocketbook since it is a relatively expensive instrument—is the proportional divider in which the arms are crossed and have points at each end. These arms are adjustable through a great range, enabling the points on end to be set at any ratio to those on the opposite end. This permits all degrees of fractional enlarging and eliminates entirely the need to rotate the dividers to enlarge the measurement. Their use in producing a 1-1/2 times enlargement is shown in the supplementary views of the accompanying drawing.

By far the most widely used method, and the one to which the drawings in this magazine are specifically adapted, is the scale enlargement in which the dimensions of the original plan are duplicated on the working plan through the use of corresponding units in a different size. For the convenience of the readers, all three views presented in M.A.N. are drawn to standard scales and either have that scale drawn right on them, or otherwise indicated. All the modeler has to do to enlarge such drawings is to lay out his reference lines, and using no equipment more complicated than a simple ruler and right angle triangle (although an architect's scale is a great convenience), measure off the dimensions on the original drawing and lay them down on the work sheet in the larger unit. Complete details on the use of various scales, how to determine the scale of drawings for which no scale is indicated, and how to make your own scales when the commercial articles are not available will be given in the next issue of this magazine, as will instructions for the proper laying out of model plans to save needless measurement and duplication.

(To be concluded next month.)

Multiple Speed Timers

(*Continued from page* 34)

pull shifts speeds whereas a slow steady pull can be used to turn the ignition off when the *BAT* switch blade of drawing 5 reaches the *OFF* position shown by dotted lines.

Note that the *HI* and *LO* contacts are separated by a space wider than the switch blade to result in an open circuit position between them. The other two spaces are less so that no open circuit occurs between *LO* and *MED* and between *MED* and *HI*. These last two spaces can also be wide as in drawing 7 if *OFF* positions are desired between every two of the three possible engine speed adjustments.

While the types of switches shown in drawings 5 and 7 do not return to *LO* position if the control thread breaks, the thread can be connected to the control handle and looped over the pilot's thumb so that one-hand operation is possible. The elastic should be eliminated or, at least shortened to only a few inches in length for such operation since we do not want the extra "slop" that the long rubber allows.

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I wrote this letter to tell you of the success I have had with my "Zing" and to thank you for the production of such a fine kit and Carl Goldberg for his splendid design.

Very truly yours,
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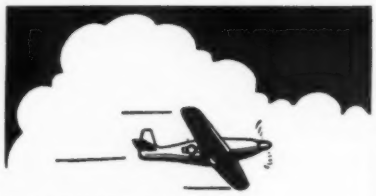

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Plane on the Cover for November M.A.N. will be the GOODYEAR GA-2 amphibian, a beautiful little job that holds great possibilities for model builders. It features a pusher motor mounted up over the fuselage. . . . Also included will be our usual 3 View and photos, plus the story of the ship's development. Don't miss these features in November

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Dual-Air

(*Continued from page 9*)

on the plan and cover this part with sheet balsa. The outer tips can be made next. Complete the left wing and turn it over, then using it for a guide build the right. Cement these panels onto the centersection with each tip raised three inches for dihedral.

The nacelles are carved from balsa and hollowed as shown on the plan. The firewall for each is now cut from 1/8" plywood and cemented in place. Then the two halves of each nacelle are fastened together. Cowlings and spinners can be added if desired.

The landing gear is bent to shape, bound to a 1-3/4" length of 1/4" sq. and cemented into the nacelle, which can now be cemented to the wing. No tail skid was used on the original as the fins serve this purpose.

The stabilizer is made in the same manner as the wing except that there is no sheet covering—the lighter the stabilizer the better the ship will balance out. The rudders are cut to shape, sanded well, and glued to the stab.

The engines are now attached to the firewalls and the tubing run as shown on the plan through the nacelle to the distributor and then to the containers, which are fastened to the wing. The distributor is simply a block of 3/8" sq. soft brass with two holes the size of the feed tubing drilled in it. Since both holes go all the way through, an X-connector is formed. This allows two tanks and two motors to be connected together. The cabin can now be finished and is held in place with pins.

The whole ship should be sanded and all cement joints re-cemented. Cover the ship with Silkspan and dope the entire ship with thinned out dope. Check the surfaces to make certain they are not warped. If a warp is found, redope that part and hold in shape till dry.

Assemble the ship, holding the wing and tail surfaces on with rubber. Glide the ship with the two cartridges in place; add no more than 1/8" elevation under the trailing edge of the stabilizer to flatten out the glide. If the glide is still too steep, move the cartridge back till a smooth flat flight results.

Screw in one full and one empty cartridge (this is done to test the ship, for in this way the duration is cut and you can see how the ship is flying); trim the ship with the rudder, then install two full containers and watch her fly. The propellers should both be the same "hand" and of 8" dia. and 3" pitch. When both props turn the same way, the ship can be adjusted to fly in the same direction of turn as it glides, which has been found to produce best results. With oppositely revolving props (the engines run equally well in either direction), the ship can be made to fly absolutely straight but will usually dip quite a bit after the motors stop before going into a normal circling glide.

WYLAM'S NEXT MASTERPLAN—

In the November issue, M.A.N. will present the first page of Bill Wylam's detailed drawings on the CURTISS P1 PURSUIT. We are sure this will please readers who have requested Masterplans of famous planes developed between the two great wars. . . . In November issue of

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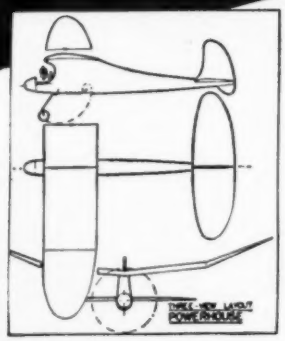

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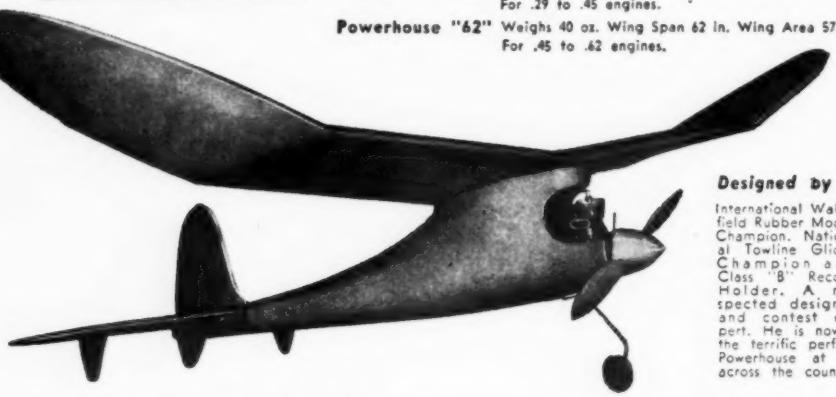

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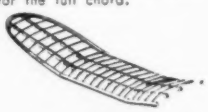

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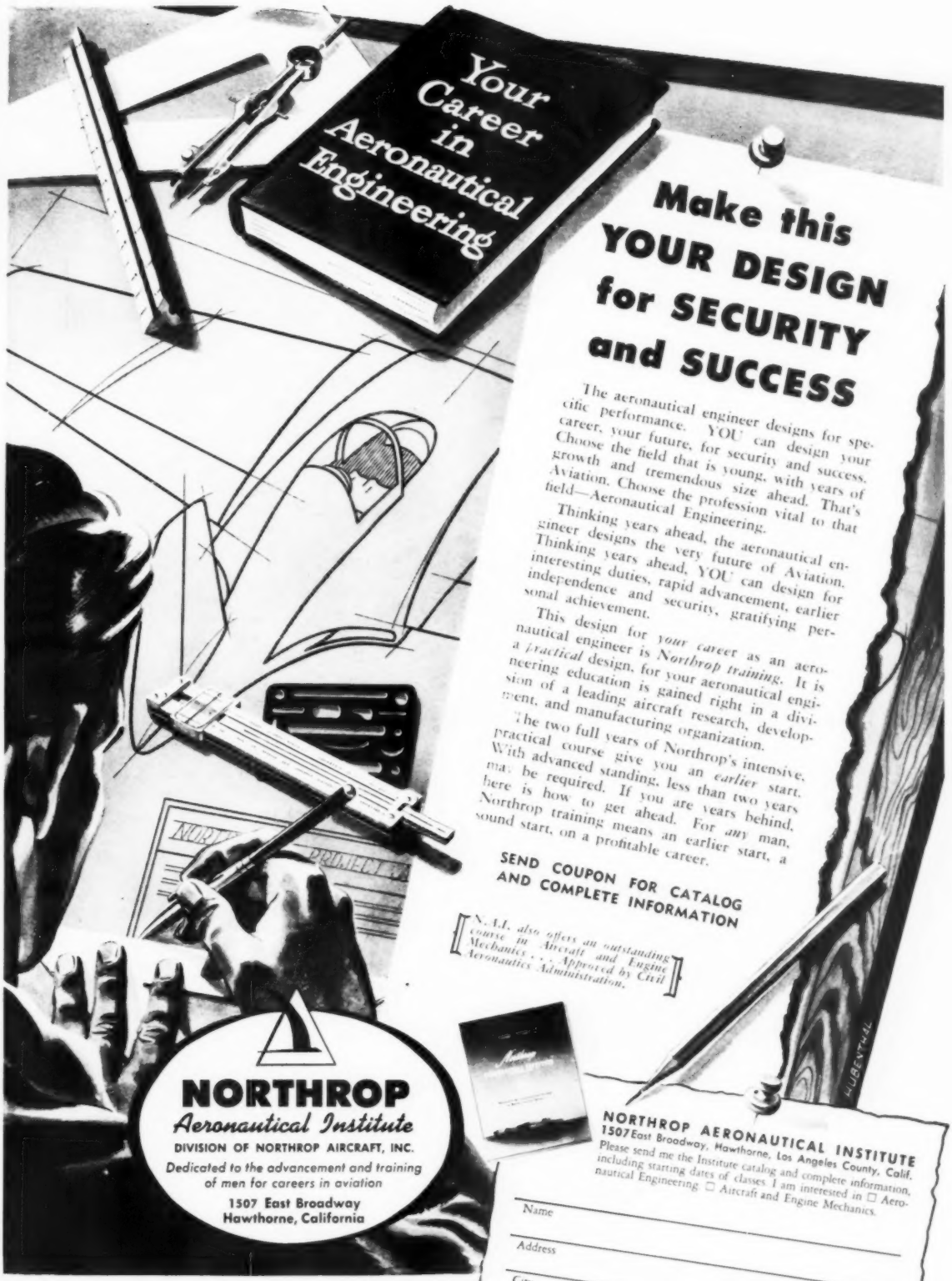

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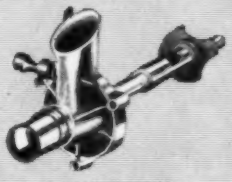

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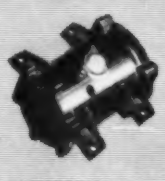

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